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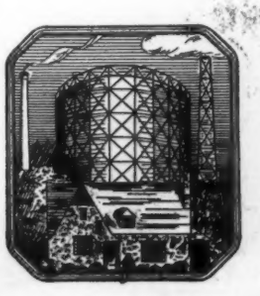

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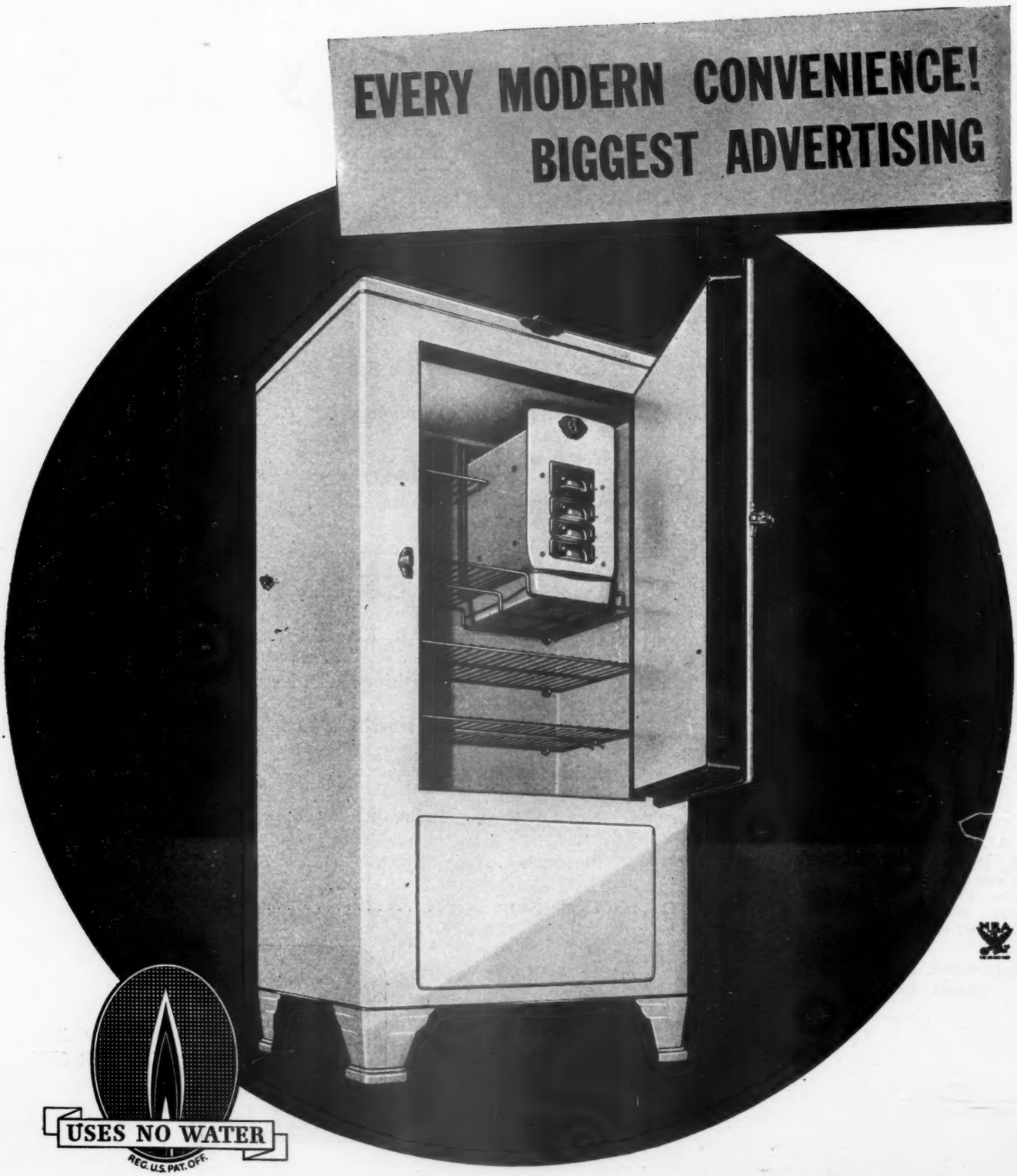


ADVERTISING PAGES REMOVED

Editorials

Gas Utility Rates and Taxes

THERE are today demands for reduction of gas rates in many communities by various interests that in a calmer period, public opinion would not sustain.

During the past two or three years many industries have run deeply in the red. While the gas industry has had earnings reduced, the great bulk of them have not shown losses over operating costs, and have thus been selected in many states and by the government as a target for increased taxes. Due to the NRA code operating expenses have increased and in some cases rates have been reduced which has caused some companies to discontinue at least temporarily, the paying of dividends, which has reduced the purchasing power of their stockholders.

Rates can only be lowered if consumption increases. Consumption of gas is on the increase both for domestic and industrial uses, and we feel sure that when consumption gets back towards normal, rate adjustments will take care of themselves.

It is manifestly unfair for the government to loan the taxpayers' money to cities to construct a competitive gas service. Gas companies are restricted in their activities in many ways as compared with government enterprises, and yet it is constantly being demonstrated that privately operated gas companies can give as good or better results to the public.

Gas companies are fully cooperating with the government through the NRA code, and it is to be hoped that government loans to communities to build a competing gas service will be discontinued. Such a policy can be nothing but destructive.

A Profound Influence

SOMETHING of the order of three hundred thousand homes were annually constructed during the years from 1923 to 1929—that is, homes in cities and districts supplied with gas. As against this record, for the past two years only about thirteen thousand residences were built each year.

Let's see what these figures mean when translated into the gas man's language.

For three hundred thousand homes there would be needed not less than twelve million feet of service pipe; approximately the same footage of house piping; three hundred thousand new meters; a quarter million gas ranges; two hundred thousand gas water heaters; a hundred thousand miscellaneous gas appliances such as space heaters, househeating furnaces, laundry dryers, incinerators, etc., etc.; a quite appreciable number of feet of main extensions; probably fifty thousand governors and regulators; and much miscellaneous material which of itself would foot up to a tidy figure.

In addition, the manufacture and installation of the above appliances and equipment would provide work for a large number of employees.

It can be seen that such a volume of business exerts a profound influence on gas company activities and, what with curtailment of the same and the comparative prevalence of doubling up of families for the past several years, it is rather astonishing that the total yearly output of gas has not suffered greater diminution than actually obtains.

In view of this condition of excessively curtailed home construction a widespread whistling while passing the cemetery will not greatly allay the tendency of the hair to rise on the back of the neck. In other words, intensive selling campaigns will only carry a certain distance. Take the case of gas ranges, for example: this appliance is a most stubborn critter in its tenacious ability to hold on to life and give fairly good service right up to its moment of almost complete disintegration—it virtually passes out of existence like the "one hoss shay." Further, in these times, customers, in a large sense, will just not buy new ranges for purposes of change or style, even though the purchase price is set at a very low figure. And similarly for other appliances.

However, two factors loom on the immediate horizon which should provide some comforting thoughts: first, there is the general knowledge that business in general is on the way back and with this movement will come a renewed building activity; second, a concerted effort is being directed toward having the government loan a billion dollars to home builders on long-term financing basis.

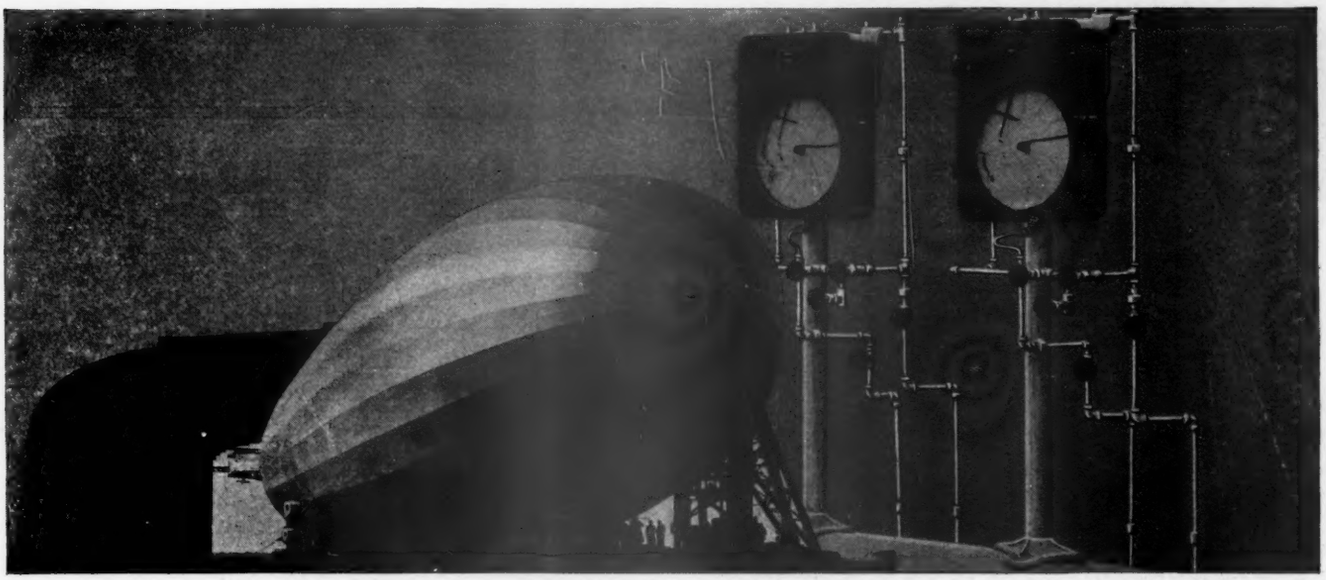
It is by no means suggested that gas companies curtail their selling and advertising efforts in the meanwhile; these activities are necessary in order to keep gas service before the public and thereby render less easy the encroachment of competitive fuels.

Breakers Ahead

THREATENED legislation proposing wholesale municipal communities by various interests large taxes on natural gas, the likelihood of considerable agitation anent rates—these are the Scylla and Charybdis plus through which our bark must be steered during the present year. And it will take some expert hands at the wheel and tiller. Foresight and judgment of a prime order will be required. We will have to have the facts in order to wage a successful campaign; and we will have to know the root sources of all this agitation. Those companies whose houses are not in order in every respect will have to indulge in some efficient and rapid renovation. We can come out on top in all of these contentions, but such a happy haven can only be reached if we trim our sails in the proper manner and face the issues with a stout heart.

Henry M. Riley

Editor



HOW THE GRAF ZEPPELIN IS REFUELED

•American Meter Company orifice meters have been utilized in refueling at Akron, Lakehurst, Los Angeles, Tokio and Pernambuco, Brazil, to attain exacting degree of accuracy required

Burning gas instead of gasoline in her motors, the Graf Zeppelin was refueled with 750,000 cubic feet of fuel gas before her recent trip homeward. Sixteen hours were required for the operation. The fuel gas is approximately 65 per cent Pyrofax and 35 per cent hydrogen.

This setup at Akron for measuring the fuel gases is the same as employed in past refuelings at Tokio, Los Angeles, Lakehurst, and the permanent base in Pernambuco, Brazil.

Choice of American Meter Company instruments in all cases is evidence of international recognition of their accuracy . . . accuracy established in the displacement measurement of the smallest laboratory pilot light's flow and maintained throughout the entire range of applications. Write for Engineering Bulletin EG2.

AMERICAN METER COMPANY
INCORPORATED
Measurement and control of Gas, Oil, Steam, Air and Liquids
ESTABLISHED 1836
METRIC METAL WORKS ERIE, PENNSYLVANIA
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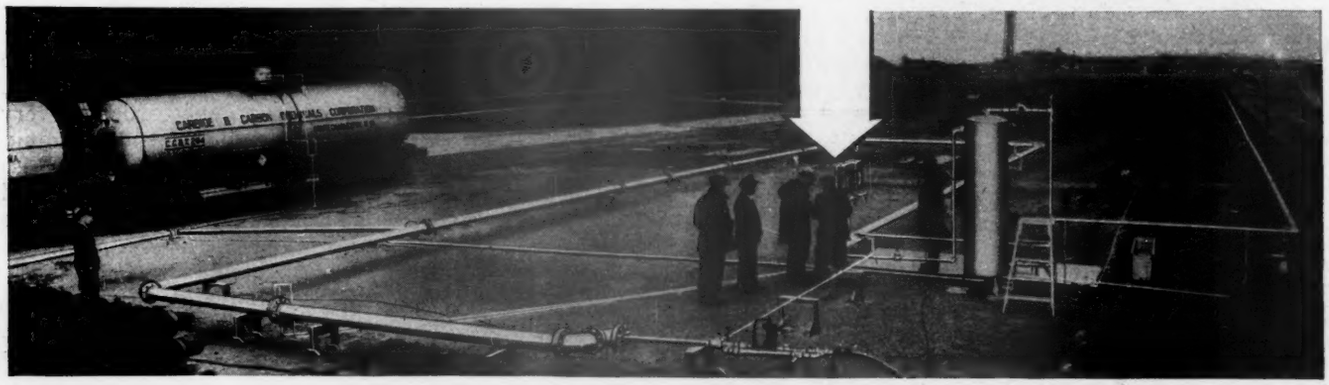
The Pyrofax gas is introduced into one end of the piping layout and hydrogen into the other end. These gases are mixed at a common outlet, and then flow through a tunnel into the air dock. Liquefied Pyrofax from the tank car is passed through a steam vaporizer, the steam being provided from the railroad locomotive shown on the siding. The hydrogen is brought in through a manifold connection and thence through a main control valve. To maintain the temperature of the two gases constant, and thereby eliminate the necessity for making corrections for flowing temperature, the hot Pyrofax gas from the vaporizer is cooled by refrigeration and the hydrogen is heated. Pyrofax gas supplied and refueling operations were supervised by Union Carbide & Carbon Corporation. Photo by courtesy of Goodyear Zeppelin Corporation.



AMERICAN GAS JOURNAL
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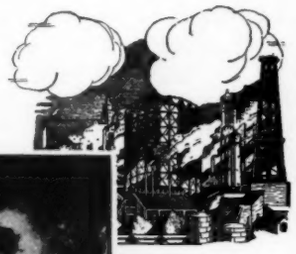
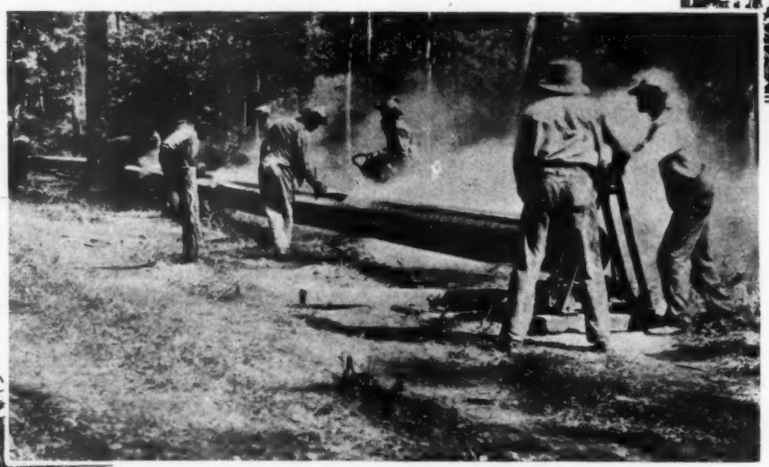
Pipe Corrosion and Pipe Protection

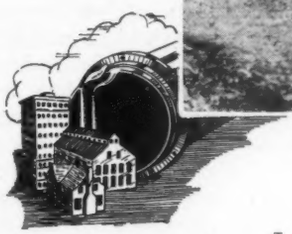
In Addition to Summing Up the Status To-Date of Pipe Corrosion Studies the Author Tells of a Particular Instance Where Steel Pipe Enjoyed a Very Long Life



By
AMOS H. ABBOTT

Gas Engineer, Northern States Power Company





Protecting a Natural Gas Pipe Line in Louisiana from Corrosion—Pouring Gangs Applying Bitumastic Enamel.

THE subject of soil corrosion of underground pipe and the consequences of pipe failures and gas leakage has been bothering gas operators for the last two generations and will probably continue to be a source of concern for a long time to come. However, there are a few facts available to us today that can act as quite definite guideposts in engineering design and which were not available a few years ago.

Read before Mid-West Gas School and Conference, Iowa State College, Nov. 13-16, 1933.

I would now like to discuss some information taken from the soil corrosion studies of the Bureau of Standards. The 1930 report covering the investigation of Mr. Logan has been discussed in a variety of ways and I will point out only a few items I think are of particular importance. Quite a variety of pipe specimens of different grades of wrought iron, steel and cast iron were buried in forty-seven soils in different parts of the country in 1922 and specimens of each of these pipes have been unearthed and examined every two years. The last report of these specimens was of those unearthed in 1930.

The effect of soil corrosion on these pipe specimens is very interesting and they give a pretty good idea of the relative life of different grades of pipe as well as some rather unusual information as to the effects of various kinds of soil on different kinds of pipe. The following tables show the average rates of loss of weight and depth of pitting of these specimens buried in the various soils.

I wish to call your attention particularly to the fact that in both rates of loss of weight and of pitting, the maximums have occurred during the first few years and the rates seem to be decreasing quite consistently. I also wish to call your attention to the fact that there does not seem to be a great deal of dif-

ference in the rates of corrosion as between the various metals. Even cast iron, on the average, seems to be affected at about as fast a rate as steel or wrought iron.

TABLE I

Rates of Loss of Weight of Pipe Specimens—Average of All Soils in Ounces per Square Foot per Year

	Pure Open Hearth Iron	Hand Puddled Wrought Iron	Bessemer Steel	Scale Free Bessemer Steel	Hand Puddled	Wrought Iron Open Hearth Steel	Bessemer Steel	Open Hearth Steel—.2% Copper	de Lavaud Cast Iron Vertically Cast in Sand Molds	Northern Ore Vertically Cast in Sand Molds	Southern Ore
2 Yrs.	.787	.883	.898	.940	.820	.871	.902	.889	.825	.911	1.205
4 Yrs.	.654	.784	.740	.700	.706	.688	.727	.697	.640	.809	1.006
6 Yrs.	.633	.692	.669	.637	.644	.662	.665	.674	.584	.807	.854
8 Yrs.	.542	.630	.576	.569	.566	.583	.584	.609	.606	.623	.706

There is, however, in the various soils some interesting information on the relative effects of the soil on pipe. For instance, in one soil location which happens to be one of our company's properties we find that the loss in weight in cast iron is considerably greater than the loss of weight in steel or wrought iron. We also note that in this same location the rate of pitting is higher in cast iron than in other metals. In practice we find that the corrosion of our gas mains conforms to this information and we are replacing cast iron pipe due to soil corrosion after some thirty years of life. In looking over similar information of other soils, we find there are all kinds of variations in the effect of soil on pipe. This information is of particular significance in that it is probably the most authentic information available on the effects of various soils on various pipes.

TABLE II

Weighted Maximum Rates of Pitting of Pipe Specimens—Average of All Soils in Mils per Year

2 Yrs.	16.4	14.9	15.2	14.6	14.8	16.2	17.1	18.6	8.3	14.5	18.4
4 Yrs.	10.1	9.33	9.72	9.45	9.64	10.0	10.7	11.1	7.7	9.9	12.2
6 Yrs.	8.9	8.3	8.0	8.5	8.3	8.7	9.0	9.4	7.1	9.9	11.6
8 Yrs.	6.8	6.6	6.5	6.3	6.8	7.2	7.2	8.0	6.4	8.7	10.2

I believe this will upset a number of theories as to the relative life of pipe and it certainly shows that no particular kind of pipe is least affected in all soils. There are undoubtedly experiences in different parts of the country that indicate a certain kind of pipe is most adaptable to soil conditions in that locality, but in other soils there are probably experiences that indicate the opposite conclusion. I believe all these experiences are in harmony with this report of soil corrosion study of the Bureau of Standards and that they indicate the necessity of obtaining actual experience data in a particular soil before conclusions can be reached as to the most adaptable pipe.

I am trying to be particularly careful to avoid any misunderstandings as to the relative life of various kinds of pipe and particularly to avoid any misrepresentation of the data obtained in the Bureau of Standards' report. This report should be studied carefully by every distribution man and he should realize that there are things, other than rate of corrosion, affecting the life of pipe.

Practically every large operating company has some actual experience in the life of pipe extending back over a period of thirty or forty years and I would like to mention here some experience I have had which has changed some earlier ideas on the life of pipe.

When I entered the gas business, one of the most impressive things I learned was that steel pipe lasted all the way from fifteen to twenty years and cast iron lasted hundreds of years. After working a few years in operating and construction departments, I began to get some better appreciation of the life of underground pipe. My earlier training, to expect steel pipe to last a relatively short time, was soon discarded. My experience was that service pipe failures due to soil corrosion were very negligible and I am going to give you a few figures of actual experience from an operating company that has a large number of services in the ground in a variety of soils extending back through quite a few years. These figures indicate that there were approximately 20,000 services in the ground twenty-five years ago. Also, approximately 1,500 services per year, all bare black pipe, have been added during the last twenty-five years. This will give some picture of the number of services in the ground and on which records of soil corrosion are available. I also wish to state that these services, at least those installed during the last twenty-five years, are of steel pipe. Probably most of those prior to those of twenty-five years ago are of wrought iron.

Quite accurate records have been kept during the last ten years of service failures due to soil corrosion and it is quite surprising to note the small amount of failures from this cause. I will list these service failures by years in which they occurred as follows:

1924	7	Service	Failures
1925	12	"	"
1926	12	"	"
1927	17	"	"
1928	23	"	"
1929	14	"	"
1930	17	"	"
1931	18	"	"
1932	25	"	"

These figures indicate that soil corrosion is not a serious problem. With services installed twenty-five years ago at a rate of approximately 1,500 per year, replacements due to soil corrosion now occur at about a rate of 15 per year or approximately 1% failures occurring twenty-five years after installation.

There is another interesting bit of information in the average life of the services which have failed and I believe this kind of information has been somewhat misleading in interpreting the average life of underground pipe. For instance, in the above case the average life of the services which have failed is approximately twenty-four years. The life of pipe which has failed has often been taken as the average life of pipe in the ground and my experience has been that such is not the case. If the average life of pipe in the ground is approximately twenty-four years, the data from this company would indicate that services should be repaired or replaced due to soil corrosion at approximately the same rate that installations were made twenty-four years ago, which would be at a rate of 1,500 per year. Instead of this, it is more like 15 per year. This all means that the life of underground steel pipe is a long time, and it seems quite reasonable to expect pipe life in this case to extend considerably beyond fifty

years. I expect most of you have experiences of a similar nature and my sugestion is that if you have not already done so, it would be quite interesting to you to keep a record of pipe failures due to soil corrosion each year and try to obtain some picture of life of pipe in the ground as well as the average life of the pipe which has failed.

Turning now to the subject of pipe protection, I would like to review briefly the latest report of the Distribution Committee on Pipe Coatings and Corrosion of the American Gas Association by Mr. Scott Ewing. This report is based on inspections of pipe specimens, which have been coated with quite a variety of commercial pipe coatings, after they had been buried in the ground approximately two years.

Electrical Test Given

In addition to a careful visual inspection of the coating and the pipe, the specimens were given an electrical test to show the electric conductance and holes in the protective material. These electrical tests are quite interesting in procedure and consist essentially of a measurement of resistance of the protective material and also produce an exact pattern of the holes and other places in the material where the electrical resistance is low. It has been found that electrical resistance of a protective coating has some bearing on the degree of protection it affords the pipe, particularly in that it is related to some extent to the moisture content of the protective material.

The different groups of protective coatings are classified in the following manner and I am presenting some comments on the relative merits of these groups of protective coatings:

1. *Cut Backs*
   Cut Backs consist of bituminous substance dissolved in light petroleum distillates or coal tar solvents. They are all applied cold and with a brush. The electrical conductances are high and all of them showed evidences of failure and resultant pipe corrosion.
2. *Asphalt Emulsions*
   These coatings are applied cold and materials are usually soft. Electrical conductance is high in the majority of cases and in all of the specimens there was evidence of protective failure and resultant pipe corrosion.
3. *Greases*
   These all showed some evidence of failure and pipe corrosion.
4. *Enamels*
   The enamels seemed to have covered quite a wide range of effectiveness, all the way from apparently complete protection or no corrosion to an extreme of most of the samples being affected with rust.
5. *Organic Reinforced Coatings*
   These are coatings of both asphalt and tar base covered with mostly cotton fabric wrapper. In most instances the outside cotton wrapper shown evidence of rotting. The actual protective quality of these coatings seems to be quite good in most cases although all of them show some signs of rusting under the coating.
6. *Asbestos Felt Reinforced Coatings*
   These coatings have stood up the best of any of the groups in both the electrical tests and in the actual protection of the pipe.

I do not care to discuss the merits of any particular commercial pipe coating material but I would advise all of you to carefully read and follow the reports of this investigation which is being carried on by the American Gas Association.

To me this investigation, although it is only started and the results are not at all conclusive particularly among the materials that have stood up well and have shown the most satisfactory results, shows that a large number of commercial coatings are practically eliminated as far as long time protection is concerned. It is quite obvious also that manufacturers of pipe coatings are continually changing their products and we hope always for the better. I think it is only fair to assume that the protective coatings on the market today are better, as a rule, than those offered two years ago.

Ideal pipe protection may be thought of as that which affords 100% protection and at no cost. This, of course, seems impossible but every distribution man who considers pipe protection and tries to evaluate it in terms of the value of added life to his pipe must make some kind of a decision on how much he should spend to prolong the life of the pipe. These pipe protection studies that are now in progress are clarifying this particular economic subject and it is to be hoped that they may continue for a few years until some more definite conclusions can be reached.

Cathodic Pipe Protection

Still discussing protective coatings, I think it is advisable to mention here a rather unusual development that has taken place in the application of what is called cathodic pipe protection. This consists essentially of passing an electric current from an electrode buried in the ground, through the ground and on to the pipe. Such a practice has the effect of making the pipe electrically negative to the soil and retards corrosion. From the tests that have been made on this practice, it appears that the cost of electric energy is quite an item and would be prohibitive for the protection of bare pipe. However, it seems likely that a practical development will occur where pipe may be given a high resistance protective coating, and the electrical protection will be effective only on the spots on the pipe where the coating is not complete. Such a method offers quite a complete protection of the pipe even where abrasions and pinholes occur in the protective coating. It does not appear to have particular promise in cities or in locations where there are a number of underground conductors.

I wish to point out again that there are some very thorough impartial investigations in progress right now on both soil corrosion and pipe protection and it is quite essential that all of us keep up to date on these investigations and interpret them in the light of our own experience and to the best advantage to our particular jobs.

Gas In Making Varnishes

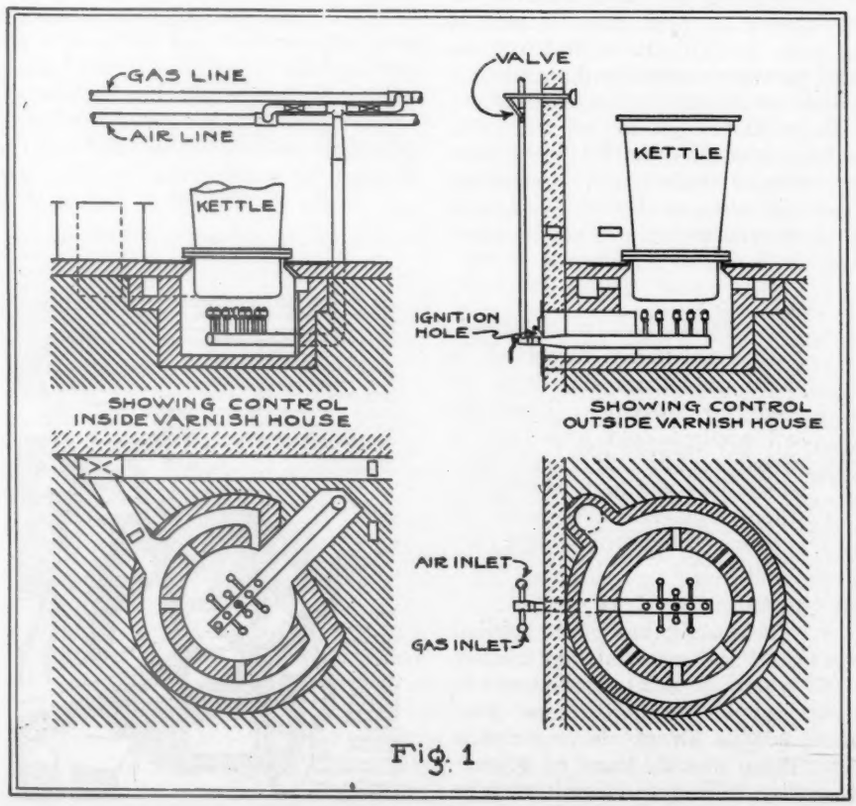
Gas Is Found To Be the Ideal Fuel for Melting Resins and Cooking Stand Oil—Not Only from the Standpoint of Competitive Costs but also Due to Its Superior Flexibility, Cleanliness and Safety in Application

By SPECIAL CORRESPONDENT

ONE of the most interesting uses to which gas has been put in industrial processes is in the manufacture of varnishes. This application is of great significance to the industrial gas engineer for the reason that gas has been found to be the best fuel for the purpose on a strictly competitive basis. The manufacture of varnish is both a quality and quantity proposition. The industry is large and the competition is severe. Gas must consequently be both economical and efficient. There must be a very definite, practical gain, when gas is employed, to offset any added cost due to the initial higher price of the fuel per thermal unit. Gas has proven to be much superior to liquid fuel as liquid fuel is much superior to solid fuel. The accurate control possible with gas, the rapidity of the melting process, the elimination of danger of accident with the fuel, the cleanliness of the operation and the convenience of tending the varnish kettles are all important advantages that the varnish maker is eager to secure in the rather exacting, difficult and dangerous process of making varnishes.

It is highly significant that gas should have been widely adopted in other countries as well as our own for making varnishes. Thus we find it largely used in Germany for this purpose, in spite of the fact that the cost of gas is much greater than the cost of liquid or solid fuel. Gas is used in the varnish and lacquer plant, as well as in the printing ink establishment, for melting the resins, such as copal resin, used in making varnish and also for cooking stand oil, that is, linseed oil, to convert it into a state ready for making printing inks as well as ordinary varnishes. The gas used for this purpose, according to a recent report in *Der Farben Chemiker*, is a mixed gas with a heating value of 3800 to 4200 calories per cubic meter (399 to 440 B.T.U. per cubic foot at 60 degrees F and 30 inches pressure). This gas was furnished at a pressure of about 50 millimeters (2.0 inches of water). Ordinary air is used for burning the gas. About four cubic feet of air are required for burning completely one cubic foot of the gas.

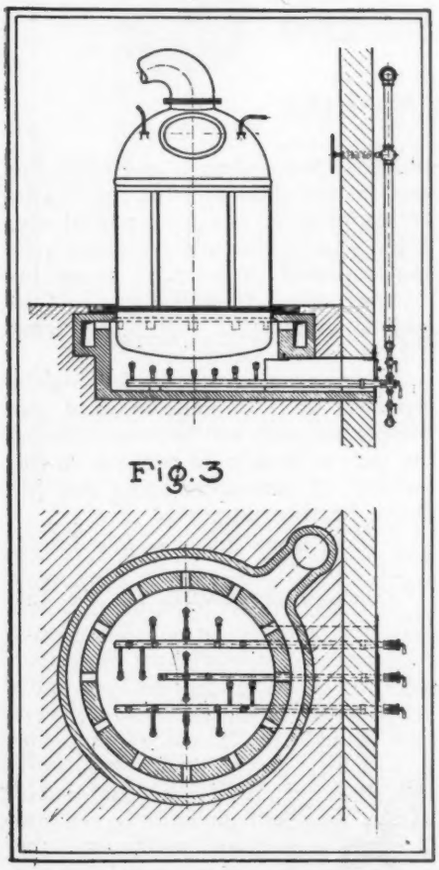
However, the ordinary low pressure burner is not suited for this purpose. The main reason for this is that the surface of the varnish kettle which comes in contact with the flame is too small for efficient cooking with a low pressure gas. The temperature of the gas flame must be high enough to ensure rapid conduction of the heat to the contents of the kettle and this is accomplished only with high pressure burners. Thus the required heat conduction in the case of copal melt-



Kettle for Melting Copal Resin.

ing kettles is 50,000 calories per square meter (about 18,600 B.T.U. per square foot of conducting surface) and, in the case of stand oil kettles, about 25,000 calories per square meter (9,300 B.T.U. per square foot approximately). The use of compressed air ensures this thermal condition and frees the varnish boiler from variations in the gas pressure, while affording him most efficient heating.

It is claimed that particular advantages are obtained with compressed air-gas installations in which a part of the combustion air is furnished under pressure while the main part is sucked automatically into the venturi arranged in front of the burners, and intimately mixed with the gaseous fuel. In this case, gas and compressed air are fed through separate pipes, the gas under a pressure of 2 to 4 inches of water and the air under a pressure of 55 inches of water. The compressed air is drawn from a suitable storage tank so that the pressure of the air is independent of the load. The venturi are made in such a manner that the gas and air are simultaneously controlled by means of a single valve so that the mixture is properly adjusted automatically without depending on the accuracy of the workers tending the kettles. The actual burners are multiple in number depending on the size of the kettle. Thus a number of burner heads are arranged under the kettle so that the surface is uniformly covered by the burning gas. The arrangement of the kettle and the burners may be seen from figure 1.



Burners Under Stand Oil Kettle.

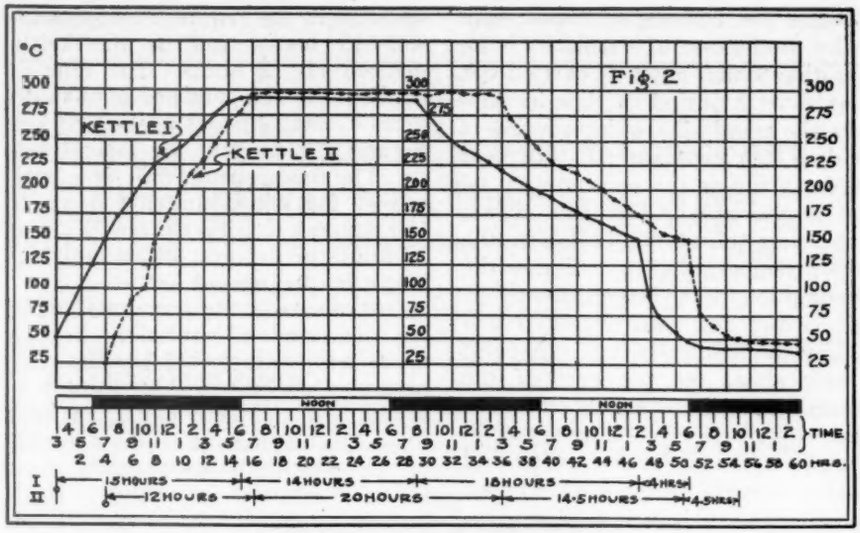


Chart Covering Operation of Stand Oil Kettle.

It is very important to select a system of heating that permits the heat to be conducted directly to the bottom of the kettle and to avoid the flames impinging on the masonry setting or on a chamotte bed beneath the kettle. This is the common arrangement in the kettle heated by liquid or solid fuel and results often in the ignition of the overheated contents of the kettle caused by the highly heated masonry construction.

Description of Copal Resin Kettle

The kettle, which is shown in figure 1, is for melting copal resin in the manufacture of varnishes. It is seen that the venturi mixing devices may be arranged alongside the kettle itself in the cooking house or outside the house. The first arrangement is the better for copal melting kettles because it is more convenient and it ensures the shutting off of the gas at the correct moment, and also between cooking successive batches.

The following results have been obtained in practical operation of a kettle of 52 gallon content. The duration of the cooking was three hours and 35 minutes in all. Eight batches were cooked within this time and the consumption of gas as well as the duration of each cook is shown in the following tabulation.

Each batch contained about 55 pounds of copal resin mixed with 55 pounds of linseed oil. The mixture was boiled at about 320 degrees C (608 degrees F). The average consumption of gas per cook was about 212 cubic feet. The duration of the average boil, without counting the time consumed in charging and discharging the kettle, was 24 minutes. The time of charging and discharging was 25 minutes in all eight boils, or about 3 minutes per boil.

Cook	Time duration	Gas consumption in cubic meters	Gas consumption in cubic feet
1	25.5 minutes	6.4	225.9
2	24	6.5	229.4
3	24	6.3	222.4
4	25	6.5	225.9
5	21	5.5	194.1
6	23	5.5	194.1
7	25	5.7	201.2
8	22	5.9	208.3
	189.5 minutes	48.3	1701.3

The heat consumed in the operation is shown in various stages in the accompanying tabulation.

	Calories	B.T.U.
8 × 25 kgs. copal to 350 degrees C is 200 × 0.5 × (350 — 15)	33,500	134,000
8 × 25 kgs. copal melted is 200 × 40	8,000	32,000
8 × 25 kgs. linseeed oil heated to 320 degrees C is 200 × 0.5 × (320 — 15)	30,500	122,000
	72,000	288,000
The heat developed from the gas used was 48.3 × 3800	183,540	734,160

The efficiency of the operation is consequently about 40 per cent without taking into consideration the heat of vaporization of the copal distilled out of the kettle and the higher specific heat of linseed oil at temperatures in excess of 300 degrees C (572 degrees F).

The consumption of gas in the case of the 52 gallon kettle is consequently about 12 cubic feet per hour (about 425 cubic feet per hour) and in the case of the 104 to 132 gallon kettle (400 to 500 liters) the gas consumption is 16 to 18 cubic meters per hour (565 to 635 cubic feet per hour).

While the melting of copal resin in the production of varnishes is an operation which must be carried out in as short a period of time as possible, the stand oil cooking process is divided into two entirely different stages as far as the consumption of heat is concerned. Thus the period of heating the stand oil up to the proper temperature necessitates the consumption of a large amount of heat, while the heat required for holding the temperature at this point is only about ten per cent of the maximum requirement. On the other hand, this phase of cooking stand oil requires a particularly careful and accurate control of the heat, so that the temperature is never allowed to exceed 300 degrees C (572 degrees F). This is the danger point. Figure 2 shows a temperature chart covering the operation of a 5000 liter stand oil kettle (1320 gallons). The curve clearly shows how well the temperature can be kept to 300 degrees C when gas is used as the fuel. In the case of the curve, marked Kettle I, the time of heating the contents up to the required temperature was 15 hours and in the kettle, marked II, 12 hours. The time of holding the temperature at 300 degrees C was 14 hours in the first kettle and 20 hours in the second kettle. The time consumed in slow cooling of the kettle contents down to 150 degrees C (302 degrees F) was 18 hours in the first kettle and 14.5 hours in the second kettle.

In both cases the process of making the stand oil, including heating up to temperature, holding the temperature, cooling to 302 degrees F. lasted two complete days. In both cases the heating up of the contents of the kettle to temperature took place principally at night. It is unnecessary to watch this part of the process in any special manner. The time spent in heating up the kettles is purposely long, so that the entire night is spent in the operation. The same kettles can be heated up to temperature in the day time within six hours.

Particular attention should be given to the time of holding the temperature just below 300 degrees C, the danger point, in the two aforementioned cases, once over 14 hours and the second time over 20 hours. The curves show where the end of the cooking takes place and the beginning of cooling. The temperature drops about 10 degrees C per hour. The compressed air may be advantageously used for assisting in cooling the kettle during this period.

Figure 3 shows the arrangement of the burners beneath the kettle. There are two to five groups of burner heads according to the size of the kettle. They are so arranged that the middle group of burners are allowed to continue burning after the contents of the kettle have attained the maximum temperature, so that the temperature is held at this point for the required time.

The consumption of gas for 100 kilograms (220 pounds) of finished stand oil varies according to the size of the batch and the desired consistency of the stand oil. It has been found to be 10 to 13 cubic meters or 353 to 460 cubic feet, or 1.5 to 2.2 cubic feet per pound.

Gas Revenues $560,302,500 For Ten Months

DURING the first ten months of 1933 revenues of manufactured and natural gas utilities declined 6 per cent, dropping from $597,790,300 in the first ten months of 1932 to $560,302,500* in the corresponding period of 1933.

The manufactured gas companies reported revenues of $315,107,400 for the first ten months, or 8.6 per cent less than for the same period of the preceding year, while revenues of the natural gas utilities aggregated $245,195,100, a decline of 3.2 per cent.

Sales of manufactured gas reported for the ten month period totaled 291,860,200,000 cubic feet, a loss of 6 per cent, while natural gas sales were 682,129,000,000 cubic feet, an increase of 2 per cent over the corresponding period of the preceding year.

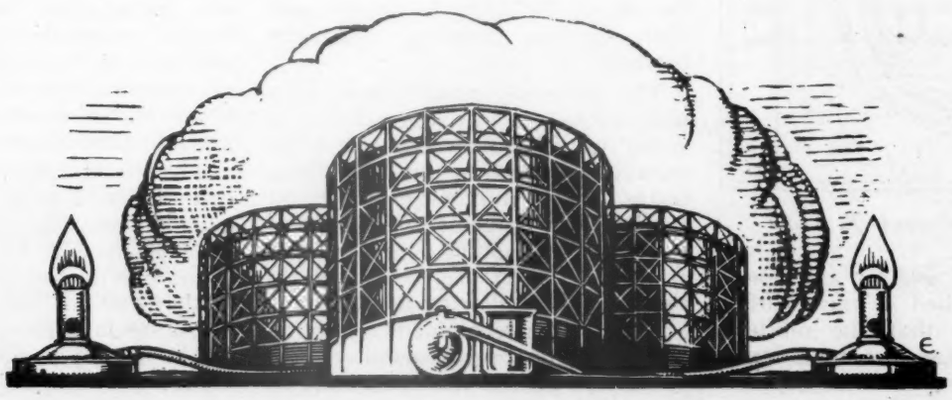
This decline in sales and revenue appeared to characterize practically all sections of the country served with manufactured gas. In regions served with natural gas however, the decline in sales and revenues was relatively much less severe, owing to marked expansion in sales of gas for industrial uses.

In New York State, sales of natural gas for industrial uses increased 50 per cent during the first ten months of 1933, while in the states of Pennsylvania and Ohio the gain in this class of business was 16 per cent and 30 per cent respectively. Some states in the mid-continent area also reported pronounced gains, industrial sales of natural gas in Oklahoma gaining 27 per cent during the ten month period.

A significant feature of the data reported by the manufactured gas companies was an increase during the year of nearly 22 per cent in the number of customers using gas for house heating purposes.

—Paul Ryan, American Gas Assn.

* Estimated $685,000,000 for the full year.

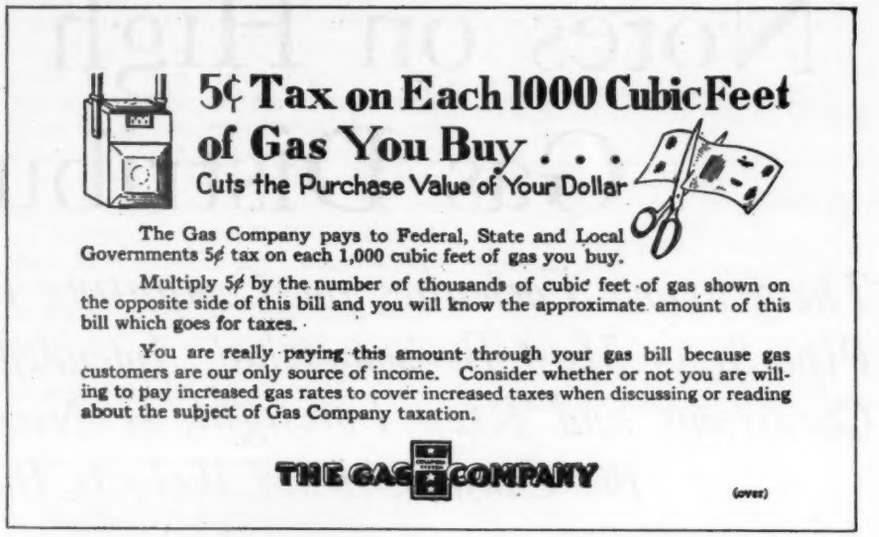


Taxing Gas Utilities

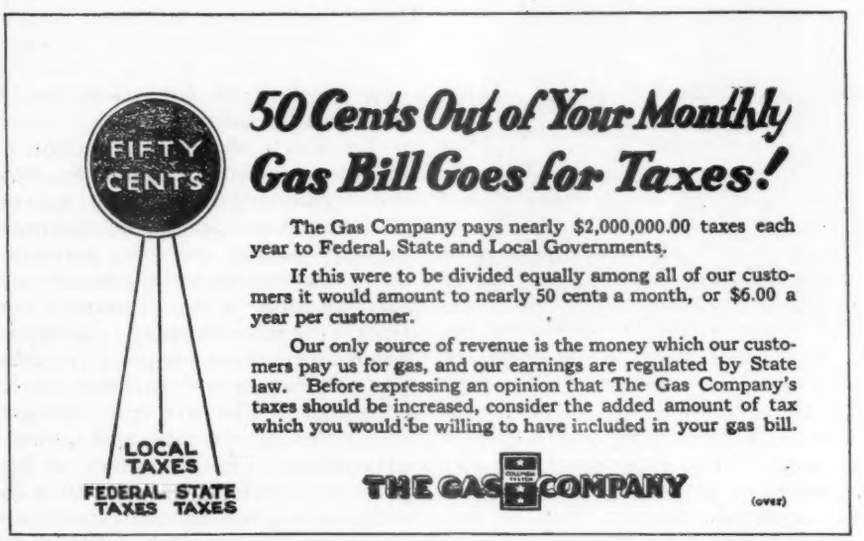
PUBLIC utilities—gas, electric, railways, etc., have always been a fertile field for taxation. The tax authorities in cities, counties, states and also the Federal government, when in need of additional revenue, have usually first attacked the utilities, until now the tax burden on them is greater in proportion than any other division of taxation.

Today gas companies are owned by hundreds of thousands of people through ownership of their stocks and bonds. Therefore, every increase in taxes adds to the burden of the stockholders as well as to just customers. This is a fact that has not been brought to the attention of stockholders by all of the utility companies as forcefully as it should be. One outstanding example of this type of tax-educational work is being done by Mr. E. M. Tharp, Vice President, East Ohio Fuel Co., Columbus, O. Every monthly gas bill has printed on the back a message on utility taxation. Three of the messages are reproduced on this page. The messages are short and to the point, but they are bound to get the gas customer thinking, for *he* must pay the tax. If he is a stockholder in the company it is doubly effective for this tax is added to his monthly gas bill, and his returns on his investment in the company securities are adversely affected.

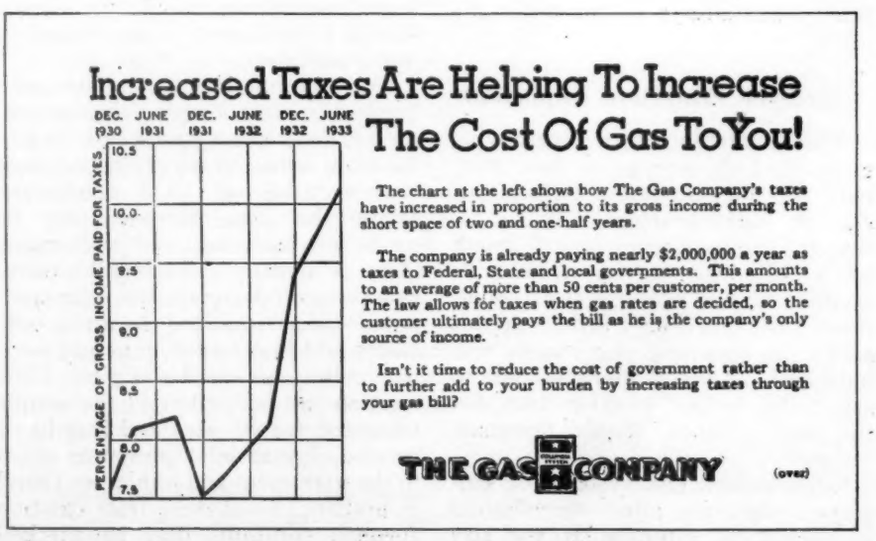
If all the gas companies would adopt a similar plan to show their respective customers and local stockholders how increased taxes affect them personally, the customer would not be so willing to listen to the politician who wants more money to spend, and has always found it easier to boost taxes on utilities than by more direct taxation. The great majority of gas customers are fair and want the gas companies to have a square deal, but they have got to be advised of the facts, particularly as to how constantly increased taxes on the utilities affect each of them, whether he is only a customer or both security holder as well as customer.


5¢ Tax on Each 1000 Cubic Feet of Gas You Buy . . .
Cuts the Purchase Value of Your Dollar
The Gas Company pays to Federal, State and Local Governments 5¢ tax on each 1,000 cubic feet of gas you buy.
Multiply 5¢ by the number of thousands of cubic feet of gas shown on the opposite side of this bill and you will know the approximate amount of this bill which goes for taxes.
You are really paying this amount through your gas bill because gas customers are our only source of income. Consider whether or not you are willing to pay increased gas rates to cover increased taxes when discussing or reading about the subject of Gas Company taxation.
THE GAS COMPANY
(over)

Reverse, Consumer's Bill—The Ohio Fuel Gas Company, Fremont


FIFTY CENTS
LOCAL TAXES
FEDERAL TAXES
STATE TAXES
50 Cents Out of Your Monthly Gas Bill Goes for Taxes!
The Gas Company pays nearly $2,000,000.00 taxes each year to Federal, State and Local Governments.
If this were to be divided equally among all of our customers it would amount to nearly 50 cents a month, or $6.00 a year per customer.
Our only source of revenue is the money which our customers pay us for gas, and our earnings are regulated by State law. Before expressing an opinion that The Gas Company's taxes should be increased, consider the added amount of tax which you would be willing to have included in your gas bill.
THE GAS COMPANY
(over)

Reverse, Consumers Bill—The Northwestern Ohio Natural Gas Company, Toledo


Increased Taxes Are Helping To Increase The Cost Of Gas To You!
DEC. 1930
JUNE 1931
DEC. 1931
JUNE 1932
DEC. 1932
JUNE 1933
PERCENTAGE OF GROSS INCOME PAID FOR TAXES
10.5
10.0
9.5
9.0
8.5
8.0
7.5
The chart at the left shows how The Gas Company's taxes have increased in proportion to its gross income during the short space of two and one-half years.
The company is already paying nearly $2,000,000 a year as taxes to Federal, State and local governments. This amounts to an average of more than 50 cents per customer, per month. The law allows for taxes when gas rates are decided, so the customer ultimately pays the bill as he is the company's only source of income.
Isn't it time to reduce the cost of government rather than to further add to your burden by increasing taxes through your gas bill?
THE GAS COMPANY
(over)

Reverse, Consumer's Bill—The Columbus Gas & Fuel Company, Columbus, O.

Notes on High Pressure Gas Distribution

The Various Formulae for Computing the Flow of Gas and Pipe Sizes Must Be Somewhat Amended by a Study of Local Conditions and Keen Foresight Is Necessary in Estimating the Consumption Likely to Be Obtained

By DISTRIBUTION ENGINEER

PROPER gas distribution design begins with the consideration of the potential demand of individual consumers whose concern is their own adequate service, whereas a utility too frequently confines study to the average demand of numerous consumers. Recording or indicating gauges depicting pressures in a main are not a satisfactory criterion of service to consumers. Charts proving excellent pressure conditions on a main are often displayed to a complainant as proof of adequate service, but such an inference does not in the least convince a consumer and is a decided evasion of engineering principles. The service pipe must have sufficient capacity under all usual conditions to supply a pressure which will allow proper house governor functioning at consumer demand.

Employee Education Important

The dictates of experience having established ¾" pipe as the most common and the minimum diameter of service, such practice will be accepted. The maximum desired length of a ¾" size service should be established for average local conditions. In a previous article in this series the operating department was indicated as the preferable one to select the service location and, for the same reasons, should designate the size.

Organization and systems of employee education affect the method of tabulating information for size selection as it is usually correlated with designation of governor and meter size. Some companies attempt to have employees memorize the maximum demand of each type of burner encountered; this is usually unsuccessful due to the quantity and diversity of information which operating department employees must remember. At the time the service length is measured the appliances are seldom installed; therefore, the total demand must be assumed. A simpler size selection method requiring the retention of fewer details consists in permitting the employee to judge from experience the size of meter or governor to be installed. The general rule can then be followed that above a certain size governor or meter, when the total service length exceeds approximately five to six hundred feet, or when any doubt enters the mind, the design should be referred to the engineering department.

For determining the relationship between service lengths, size and capacity, there are a number of formulae from which to select the one most representative of local conditions. While the same formula may be used for both services and mains there is usually considerable variation between the quantity of gas computed using standard formula constants and that found on actual tests, particularly on small size pipe. Flow tests should be made and the results tabulated for all sizes and lengths of service pipe at inlet pressures equal to the maximum and minimum found in practice; from these tests existing formula constants may be checked and the constant most closely approaching local conditions used, or a new constant as determined by the tests can be substituted.

To check the field selection of service size, some companies have the engineering department approve all services and stamp the maximum capacity on the order for estimates. The new business department may then include in the consumer contract a definite capacity, placing responsibility of its adequacy on either the new business department or the consumer. The average consumer views this as red tape and unnecessary delay. The percentage of high pressure services, other than minimum size, from an analysis of several companies is from 1/10 of one per cent to ½ of one per cent, which justifies eliminating engineering expense from all but those of considerable length or large capacity requirements.

Service Capacity Determination

The tests made for determining service capacities should be under conditions as nearly identical to those found in the field as practical. The primary purpose is to determine the quantity of gas it is possible to secure when a minimum pressure exists in the main and such restrictions as the tap in the main, service tee, bends, shut offs and house governor exist between supply and consumption, rather than to check the friction constant in a formula which is derived from straight pipe and unrestricted flow conditions.

The minimum main pressure selected should be the lowest encountered under average conditions. For

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DETROIT MICH.

instance, on a system having variable distribution pressures during the year of from seventy to thirty pounds near the compressor station and from ten to five pounds on the extreme ends and on regulated sections, five pounds was adopted as the pressure for test purposes. There will be occasions when the main pressures will be lower than five pounds due to unexpected load, shutting off a main and temporarily supplying consumers from the main storage or other unusual conditions; but designing for such infrequent occurrences is unwarranted. Even when such unusual events are encountered service to the consumers having undersized services may be unaffected, since through diversity of use, the period of maximum service demand seldom coincides with low main pressures resulting from the unusual conditions.

The table below illustrates a series of tests with water gas of 0.6 gravity, with main-pressures maintained at five pounds, a service of standard construction, one or more house governors and low pressure meters. The governor outlet pressures were maintained at five-inches water column. It will be noted from the equal capacities that, up to and including 300 feet of length, a 1¼" service has a greater capacity than the governors, which are affected in capacity above this length by the drop in service pressure. The same applies to a 2" service but the limiting distance is 400 feet. Under the table conditions, no ¾" service should be run over 600 feet, since imperfections in main taps or restrictions, in addition to those ordinarily found, may result in improper functioning of the governors and poor service. This increase in size, regardless of capacity of services over 600 feet, would involve only slight capital outlay as such service lengths are seldom encountered.

High Pressure Services

Length	Maximum Capacity Cu. Ft. per Hour	Size
100'	1320	¾"
	3000	1¼"
	5000	2"
200'	1090	¾"
	3000	1¼"
	5000	2"
300'	950	¾"
	3000	1¼"
	5000	2"
400'	860	¾"
	2940	1¼"
	5000	2"
600'	690	¾"
	2360	1¼"
	4700	2"
800'	1520	1¼"

A study of the capacity table indicates the value of actual tests in establishing service size. It is often difficult to determine the arithmetical substitute for the many unknowns in a flow formula and when the formula has been reduced to one unknown and can, therefore, be solved, there is no assurance that the conditions selected will remain constant. On a main where a number of consumers must be considered, the law of averages allows the selection of figures more closely approaching average conditions. The few services which will be other than minimum size do not warrant any considerable expense for engineering studies, considering the slight difference in cost between the various

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sizes of services and especially the effect of the additional cost on total capital expenditures. Engineering efforts should not be minimized in providing suitable appliances and their proper installation.

Main Calculations

In main design it is impossible to solve certain equations and secure direct results, as no single formula includes all factors. The process consists of comparing two sets of assumptions and changing certain factors in the equations until the results satisfactorily and reasonably agree.

In practically all common flow equations the quantity of gas is secured in cubic feet per hour at 14.7 pounds per square inch atmospheric pressure and 60 degrees F. temperature of gas, which should be assumed in the following equations unless otherwise noted. The following are the most common formulae used in the design of gas systems.

Weymouth Formula for Gas Flows

$$Q = 18.062 \frac{To + t}{Po} \sqrt{\frac{(P_1^2 - P_2^2)\, d^{5\,1/3}}{S\,(To + t)\,L}}$$

Q = Cubic feet per hour at 14.7 pounds per square inch atmospheric pressure and 60 degrees F.
d = Inside diameter in inches
S = Specific gravity compared to air = 1
L = Length in miles
P_1 = Initial absolute pressure in pounds per square inch
P_2 = Final absolute pressure in pounds per square inch
To = Absolute temperature, 460 degrees F.
t_1 = Degrees F. above absolute
Po = Absolute pressure base
With $t_1 = 60°$ and Po = 14.7

$$Q = 28.02\, d^{2\,1/2} \sqrt{\frac{P_1^2 - P_2^2}{SL}}$$

Pittsburgh Formula for Gas Flows

$$Q = 36.78 \sqrt{\frac{d^5\,(P_1^2 - P_2^2)}{SL}}$$

Q = Cubic feet per hour
d = Inside diameter in inches
S = Specific gravity compared to air = 1
L = Length in miles
P_1 = Initial absolute pressure in pounds per square inch
P_2 = Final absolute pressure in pounds per square inch.

Cox Formula for Gas Flows

$$Q = 33.3 \sqrt{\frac{d^5\,(P_1^2 - P_2^2)}{SL}}$$

Symbols same as for Pittsburgh formula.

F. H. Oliphant Formula for Gas Flows

$$Q = 42\,a \sqrt{\frac{P_1^2 - P_2^2}{L}}$$

Symbols same as for Pittsburgh formula.
a = A constant depending on diameter.

Diameter in Inches	*a*
2	7.0
3	16.5
4	34.1
5	60.0
6	96.0
8	198.0
10	350.0
12	556.0
16	1160.0
18	1570.0
20	2055.0
24	3285.0
30	5830.0
36	9330.0

Lowe Formula for Gas Flows

$$Q_M = c \left(\frac{P_{g1} + 14.7}{14.7}\right) \sqrt{\frac{d^5\,(P_{g1} - P_{g2})}{0.0761\ S \left(\frac{P_{g1} - 14.7}{14.7}\right) l_f}}$$

Q_M = Cubic feet per minute
P_{g1} = Initial gauge pressure
P_{g2} = Final gauge pressure
d = Diameter in inches
l_f = Length in feet
0.0761 = Weight of one cubic foot of air at atmospheric pressure
S = Specific gravity of gas with air = 1
C = Constant depending on diameter

Diameter in Inches	*C*
½	36.8
2	52.7

3	56.1
4	57.8
5	58.4
6	59.5
7	60.1
8	60.7
9	61.2
10	62.1
14	62.3
16	62.6
18	62.7
20	62.9
22	63.2
24	63.2

Unwin Formula of Gas Flows

$$Q = 1{,}323{,}250 \sqrt{\frac{P_{w1}^2 - P_{w2}^2}{P_{w1}^2} \left(\frac{P_{w1}}{P_{w2}}\right)^{\frac{1}{n}} \frac{D^5}{ZS\,l_f}}$$

Q = Cubic feet per hour
P_{w1} = Initial absolute pressure in feet of water
P_{w2} = Final absolute pressure in feet of water

$$\frac{\text{Gauge pressure}}{0.441} + 34 = \text{Absolute pressure in feet of water}$$

l_f = Length in feet
S = Specific gravity
D = Diameter in feet

$$Z = \text{A constant} = 0.0044 \left(1 + \frac{1}{7D}\right)$$

Diameter in Inches	*Z*
2	0.0082
4	0.0063
6	0.0057
8	0.0053
12	0.0050
16	0.0049
18	0.0048
24	0.0047

The results secured by substituting the same numerical values for identical factors in these several equations vary considerably. Assuming a diameter of two-inches, a length of one mile, initial pressure of ten pounds gauge, final pressure of five pounds gauge and a specific gravity of 0.6, the resulting quantity in cubic feet per hour is as follows:

Formula	Q
Pittsburgh	4002
Coxes	3623
Oliphants	4381
Lowes	3339
Unwins	2208
Weymouth	3422

The determination of the most applicable formula for use on a particular system requires either tests under field conditions or arbitrary selection. If tests are made, they should include all sizes of pipe found in the system, as the formulae not only give varying results for a single size, as noted above, but results from any one formula will differ in the percentage variation from the tests on the various sizes. The formulae involving less computation will often approximate test results closer than those with more numerous factors. After the tests are completed the constant may be changed to agree with test results. The field tests should be made on pipe having the average quantity of bends and fittings so that future computed results will apply to actual conditions. On the ordinary distribution system flow of gas is at a comparatively low velocity, so that bends and fittings have an immaterial affect, whereas a high velocity is maintained in large transmission mains with the resulting important affect on flow due to these obstructions. Field tests will in most cases give quantities within the ranges found by using the Cox, Lowe or Weymouth formulae.

Determination of Quantity

Many actual tests, theoretical studies, and analyses of conditions have indicated the necessity of considering the demand within ten or fifteen minute periods on low pressure systems whereas the inherent flexibility of pressure control and the large pressure variation possible avoid the consideration of such low periods of time on high pressure mains. The assumptions made in the design of any new distribution system should be on an hourly period of time taking those conditions assumed to exist during the hour of peak demand, as the accuracy of such assumptions does not warrant the use of shorter periods. Field studies on high pressure mains have not only indicated a wide variation in average consumer's demand between parts of a single distribution system but also in comparing different systems as units. The studies on probability and diversity of demand are both interesting and valuable, especially in the re-design or conversion of an existing system, but their application to new developments is practically impossible because the number of gas consuming units to be installed in each building and the character of a new section must be assumed, as no two territories will be found to be identical in character.

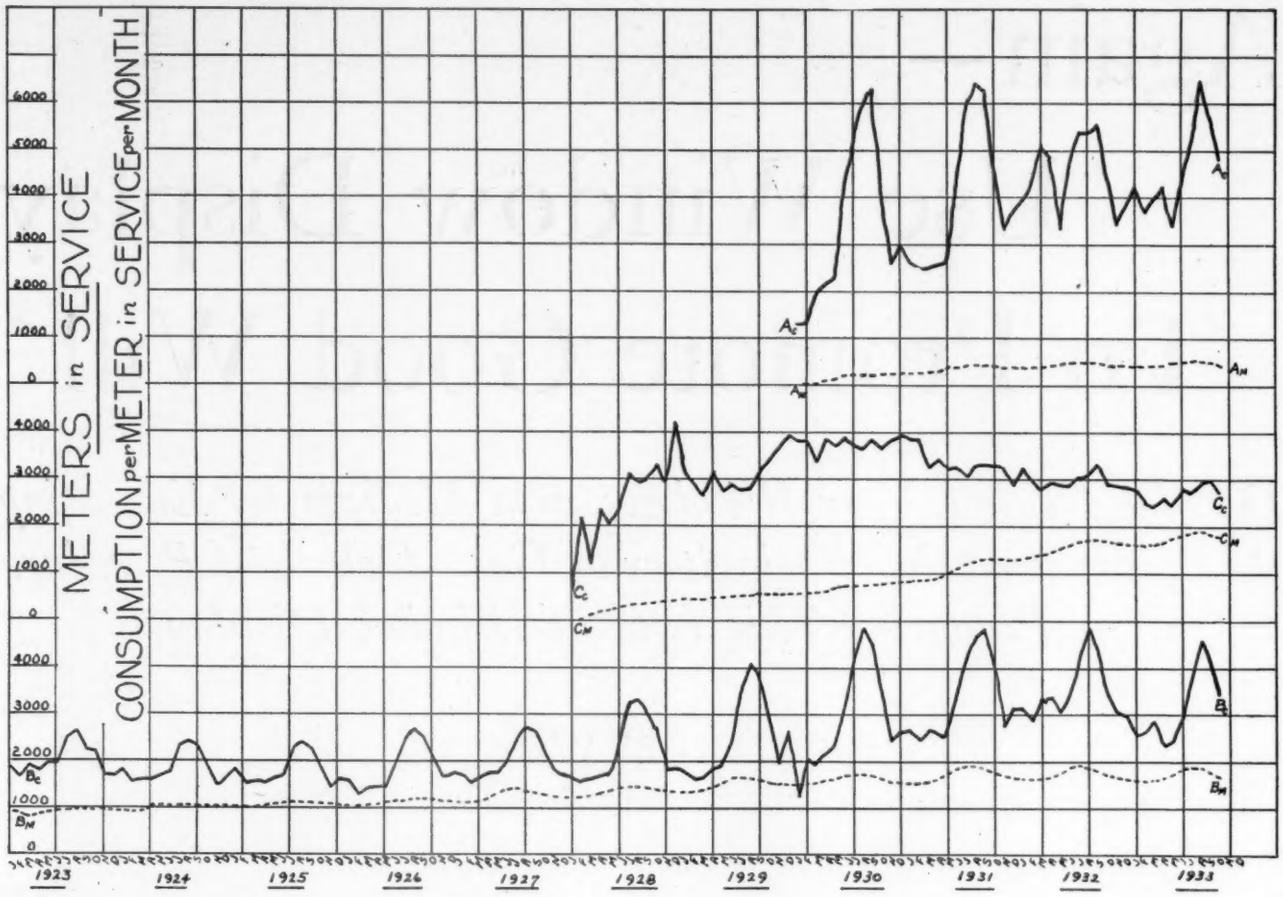
A study of curves A and B, which are the consumptions per meter per month from two similar territories four miles apart, indicates the considerable variation in demand which is in proportion to the consumption per meter per month. Both of these territories have a high summer season demand due partly to an influx of users of large quantities. The increase in consumers is approximately ten per cent. The winter months exemplify the diversity in the demand of smaller consumers.

Twenty cubic feet per consumer per hour was the peak demand selected when designing village A, although village B which was in operation had a peak demand of only eighteen cubic feet per consumer per hour. This higher demand figure selected for A was partially due to the number of large potential consumers who constituted approximately fifteen per cent of the total consumers as against eight per cent in B, and because the total number of possible consumers was considerably lower than in B as in territory A the original main installation passed only five hundred buildings, while territory B had 1500 existing consumers when the demand studies were made. The considerable difference between the demand in the peak and low months is not entirely due to the increase of seasonal consumers, as can readily be ascertained from a study of the curves showing the number of meters in service, but also from the seasonal population increasing to a more marked degree than meters, the population often being fifty per cent greater at the peak than when meters were at a minimum for any year.

As expected in Territory A, the demand in the first few years was considerably higher than assumed for designing purposes, being twenty-seven cubic feet per consumer for the first two years, twenty-three cubic feet per consumer for the third and twenty-four in the fourth year. This territory having exceeded in number of meters the five hundred buildings passed by the mains as originally installed, has now reached approximate saturation and while the total consumption of gas per consumer may increase slightly through more intensive sales efforts, there will be little effect on the peak demand due to the diversification attendant with the variety of uses. The original few years of high demand per consumer were offset by the few consumers, so that main sizes during this period were more than adequate. During the past two years the increase over design demand was compensated for by raising pressures at the control point two pounds.

A Question of Foresight

An interesting feature of territory A is that, while under the general supervision of a utility operating many such territories, it reached saturation at an exceedingly rapid rate with a higher demand than any of the other territories. The training of the new business manager in territory A was identical with the other district managers but the greater success was due to better foresight. In this particular utility the new business department in each division has usually concentrated on the sale of ranges, as



Curves showing consumption per meter in service per month which would be indicative of the hourly demands, together with meters in service, for three ter ritories which adjoin each other.

such practice results in an attractive report showing a large number of unit sales. In territory A the manager was also in charge of the commercial sales and activities of an existing electric system. His decision on gas was that the sale of ranges would be adequately provided for through contact with consumers calling at the showroom or by plumbers who would be attracted by the quantity of sales possible, where the gas company was not making a particular drive thus encouraging plumber cooperation. This policy actually resulted in the same percentage sale of ranges as other territories with less sales effort, and allowed the manager to concentrate on the promotion of load producing units such as water and house heaters which ordinarily do not warrant plumber contractor's efforts. As a result, on a 90 cents per 1000 cubic feet gas space heating rate, this territory has five percent of its consumers using gas as the only means of house heating compared to one and ¾ percent for the combined territories and the proportion of water heaters is also considerably higher. Territory A illustrates how load predictions are altered by personal factors.

The curves of territory C illustrate a different condition. This territory was opened in two sections, the first consisting of mains passing 1078 buildings. The new business department was similar to that of territory A, as it included the functions of commercial activities in connection with an existing electrical system. In this case, although the new business department was inadequate to handle so many potential consumers, excellent results were accomplished by intensive efforts on hotels, restaurants, and such types of large consumers together with continuous promotion of water heaters which resulted in a consumption per meter per month considerably above the average for all territories. Ranges were not neglected, as again plumbers actively engaged in their sale were materially aided by the utility assisting in financing and allowing them to display ranges which were purchased by the utility.

In the second section of the territory construction commenced two years after completion of the first section and passed 1806 buildings. The central organization did not see fit to increase the new business force which resulted in a slow rate of meter saturation and the new section has so low a consumption per meter per month as to materially lower the consumption per meter per month in the two combined sections. The initial enthusiasm and desire for gas service in both sections declined noticeably before it could be fulfilled and a marked result is an increase in complaints from the second section regarding such matters as high bills, establishment of service, etc., although operating service is excellent and equivalent in both sections. A major effect was a lowering in the morale of the new business department through lack of support on the part of the central organization.

The pronounced effect of the addition of the latter section can be seen by the demand per consumer per hour for the past five years which has been 20, 18, 14, 13 and 12 cubic feet with no indication that there will be any increase for a considerable time and not until promotional efforts are increased by additions to the personnel. The peak hour demand per consumer was assumed as

(Continued on page 38)

Again— Use Window Display To Promote Good Will

Do Not Neglect Your Windows as a Medium for Educating the Public about the Whole Story of Gas. Details of Procedure in Preparing This Type of Window Display

By STUART BRATESMAN

Manager, Display Department, Boston Consolidated Gas Company

LAST spring, on these pages, the writer set down a few facts and suggestions regarding the utilization of gas company windows for institutional advertising as well as straight appliance sales. Since then it has been brought to mind that many gas companies would welcome additional ideas and data on this neglected subject.

It is certainly true that the gas industry has a tremendous job on its hands to educate the public about the whole story of gas; its cleanliness, its speed, its flexibility, its controlled features and above all, its economy. We of the industry know this, we believe it, or we wouldn't be selling it; but does the public? We must constantly drive home these thoughts in our advertising, in our window displays. How do you suppose our electric brothers have done such a wonderful job in making the buying public "electricity - conscious?" It's by advertising! Day in and day out! You can't do too much institutional advertising! There is always some person who is a bit skeptical or afraid of gas. It is up to us to educate that person as to the true benefits of the fuel.

One very effective medium for conveying educational themes to the public is your windows. There they are,—24 hours every day in the year, standing ready and willing to get your message to the passersby. What better, and incidentally, what cheaper medium have you in your own building?

After you have decided to try

Emphasizing What Is Back of Service.

Tieing-in with a National Movement.

some of these educational themes in your own windows the question arises,—how do we go about preparing such advertising? It being the purpose of these display articles to stimulate interest in window advertising and to furnish tangible ideas and suggestions, you can secure enough starting ideas from the displays reproduced with these lines to start the ball rolling. It is also brought to your attention that the article dated May, 1933, of this series has three effective educational ideas with it. Reproduced with this article are three more institutional displays for your use.

Exemplifying Security.

If you wish I will explain the procedure in preparing one of these sets. Suppose we take the display captioned, "Tested and Approved." The giant hand and test tube were cut out and painted in brilliant violets and white on beaverboard. Hidden lights illuminated this hand from behind. The background areas were painted in gradations of blue, from a very deep shade to a high tint. The cut-out letters were white and black.

To illustrate the actual testing of the gas we photographed one of the laboratories of the company and then enlarged this photo to giant proportions for legibility through glass. This photographic type of illustration gives the reader the actual conditions of the testing. We followed up these poster spots wth a single paragraph of copy, orange on black, outlining the testing process. This display was routed through every company office in the city and it was felt that a good proportion of the consumers on the company's lines viewed and read it.

It is hoped that these thoughts will serve as a reminder that it is a part of our job to sell the industry to the public. Try some institutional advertising in your windows, now! They help build one of the most important links between your gas company and the public,—good-will.

House on Wheels

IF you should visit Philadelphia in the near future and should chance to see a brick house ambling down the street some fine winter morning—don't lay it to failing eyesight, or to having eaten too heartily of lobster the night before, or to any other form of Philadelphia hospitality.

What you see is not the effect of failing vision, nor of any indiscretion of diet, nor is it a mirage. It is merely the new traveling showroom of The Philadelphia Gas Works Company.

This novel vehicle, which was quite recently placed in service, outwardly resembles a typical Philadelphia colonial brick house. It is designed to carry a display of gas appliances in realistic home settings direct to the doors of the company's customers.

It consists of a light-weight two-wheel trailer coach, approximately 25 feet in length, which is drawn by a 6-cylinder coupe. Red brick walls, a green shingled roof, and doors and window sash finished in "antiqued" ivory combine to give the coach an authentic colonial style that is both distinctive and attractive.

The forward part of the coach represents a modern and correctly-planned kitchen that would fill any woman's heart with envy. It is furnished in soft shades of blue, peach and ivory and floored with inlaid rubber tile. It has the newest style cupboards, a monel metal sink and work table, and a neat little planning desk. Most intriguing of all are its beautiful automatic gas range and Electrolux gas refrigerator—both of which are placed according to a definite plan for saving time and energy.

In the rear part of the coach is a modernized basement setting, with fanciful wall and floor designs which effectively set off an automatic gas water heater and gas furnace display.

Most of the gas appliances displayed, including a gas steam radiator used in heating the coach, are demonstrated in full operation. The gas fuel, which is identical with that supplied to Philadelphia homes, is obtained from cylinders carried in a special compartment.

The coach is manned by a uniformed driver, local sales representatives and a Home Service Division instructor who acts as hostess and conducts cooking demonstrations. Each day it is stationed in a different section of the city, where housewives of the neighborhood may visit the display. It is also planned to extend its use from time to time to leading gas appliance dealers of the city.

Exterior—Demonstration Coach of The Philadelphia Gas Works Company.

Much public interest has been shown in this unique method used by The Philadelphia Gas Works Company to display and demonstrate modern gas appliances, and many sales already have been traced to its influence.

One-Call Plan Increases Sales

Long Island Cooperative Plumber Centers Outdoor Selling on Single Visit, Induces the Prospect to Visit His Attractive Display Floor and Gets Results

By R. C. NASON

CONTRARY to the accredited method of following prospects for gas appliances until they either sign on the dotted line or indicate that they have no intention of so doing, Ideal Home Service, Long Island City, East River Gas Company dealers, find the "one-call" method unusually effective. In the opinion of John Korinek, manager, too much time is lost in making innumerable subsequent visits on prospects for appliances, and hence, it would be better to utilize this time in contacting new prospects constantly.

Working on this basis, the salesmen of this concern, which also does plumbing and heating, make daily calls on about 20 local residents each. After conversing with housewives it soon becomes apparent whether or not sales can be made. All prospects who look like customers are "dated" for a visit to the attractive display room of the dealer. Hence, on many Saturday evenings there are from six to a dozen visitors in the store at once, looking over the new patterns in gas ranges, water heaters, room heaters and other appliances carried by the dealer. Rarely do they go away without either placing an order or promising to do so at a later date.

The fact that plumbing and heating contracting is a division of the Ideal Home Service business naturally places the executives and employees of the company in daily contact with a large number of Long Island City residents. When journeyman plumbers enter homes, one of the duties with which they are charged is to look around at the appliances in use. If they are "seedy" and appear as if they should be replaced the men fill out report cards upon their return to their employer's office.

The daily reports then are handed to salesmen who call on those listed. The data on the cards gives them something to talk about besides mere patter about the general subject of improvement. In the event of sale, the journeymen are compensated with gifts of from $2.00 upwards, depending upon the amount of the orders taken. These small rewards spur the interest of the craftsmen, who often make direct sales themselves.

Being certified dealers of the Consolidated Gas Co., through its subsidiary, the East River Gas Co., Ideal Home Service sells only appliances recommended by the gas company. Most of the appliances in stock, moreover, are loaned by the gas company. Considerable time-payment-plan paper also is being carried by the gas company. One observes that the contractor-dealer is considerably influenced by the utility company.

A close hook-up of this nature makes it advantageous for the gas company to help its dealer merchandise in the best and soundest manner and prevents possibility of the contractor making any but correct installations. The contractor's ability to do perfect work was sounded out before the dealer-utility connection was suggested.

The gas company also is able to refer prospective customers to the Ideal Home Service and send out advertising matter in the interest of the dealer. This is the sort of co-operative plan which has been steadily growing in favor in this section of late. Occasionally a representative of the gas company joins forces with the dealer, pointing out correct merchandising methods and coaching the dealer and his salesmen in intricacies of design, advantages and related matters. Manager Korinek, of the Ideal Company, on the other hand, attends merchandising meetings of the Consolidated Gas Co. frequently.

The Long Island City firm also is the accredited representative of a large boiler manufacturer which has fostered distributor-dealer relations similar to those of the gas company. They too, give the dealer leads. Between the two, manufacturer and gas company, rarely is the Ideal store without at least one visitor. The new-business department of the East River Gas Co. helps the Ideal firm in still another way, namely by giving them the names of all residents whose ranges, water heaters and refrigerators are known to be in such bad condition that new appliances would be positive blessings.

Often such leads come about from the complaint department. A housewife, perhaps, complains that her bill is far too high. Inspection may determine that appliances are old and poorly designed, connections wrong—particularly in connection with hot water piping—parts broken or missing. The information is passed along to the sales department, which, in turn, transfers the information to one of the good dealers on the list, of which the Ideal Home Service is one. The constant and combined merchandising efforts of the Ideal company and the gas company serve to increase the volume of appliance business transacted.

ELEMENTS OF GAS TECHNOLOGY

Operating the Gas Producer

(Continued from December issue)

There are six sources of heat loss. The first is the heat carried away in the producer gas itself. This is a very large item since the producer gas as a usual rule escapes from the apparatus at a high temperature. By making the fuel bed deep some cooling effect can be exerted on the producer gas and heat may be saved to a certain extent by being transmitted to the cooler fuel. A simple calculation shows that approximately one-third of the heat generated in the producer will be carried away by the producer gas when five per cent steam is used. It is assumed that the temperature of the outflowing gases is 600 degrees F and that 6.8 pounds of gas are produced per pound of coke.

Another source of heat loss is radiation, which is considerable and which can be controlled by water-jacketing the producer to make a steam boiler for the production of the steam used in making the gas, and also by utilizing the heat of radiation to heat the air blown into the fuel bed.

Heat lost by dissociation of the coal into coke and gaseous products is the third loss. However, it is felt that this loss is not very large and therefore of little practical importance.

The heat carried away in the solid products from the producer is another loss, which is, however, of little moment. In those producers that have a water-bottom, there is not much loss of heat from this source as the heat that reaches the water is utilized to good purpose in the production of steam.

The fifth loss is due to carbon dioxide in the producer gas. This is probably the most serious loss of heat in the operation of the producer, for it represents the complete combustion of a certain quantity of fuel to form a gas of absolutely no thermal power. Theoretically all the carbon dioxide should react with the incandescent carbon and be decomposed to form carbon monoxide, but this does not take place in practical work due to various reasons, such as too shallow fuel bed or too low temperature therein. A check should always be made of the percentage of carbon dioxide in the producer gas, as one with a large content is a very poor gas and indicates inordinate consumption of fuel in the producer and low thermal efficiency.

The sixth and last source of heat loss in the producer is in the use of excess steam. The high specific heat and latent heat of steam make this loss of considerable importance.

It has been claimed that a well-operated producer will not show a heat loss of more than fifteen to twenty per cent of the available heat in the fuel.

For a more complete description of these various types of producers, the reader is referred to Haslam and Russell "Fuels and Their Combustion," pages 581-597 inclusive, and to the catalogs of the various manufacturers of such apparatus.

Water Gas and Oil Gas

WATER gas is the gas produced when steam is acted upon by incandescent carbon. It is a mixture of permanent gases and is present in all forms of producer gas. It is also formed, in some degree, in nearly every kind of gas-making apparatus, whenever water is present in the blast.

When steam alone is used, the resulting product is known as blue water gas on account of the color of the flame. Blue water gas, while comparatively low in B.t.u. content (see table 9, page 26, July, 1933, issue), has a high flame temperature, superior in this respect to both natural gas and coal gas. As it contains a high percentage of CO, it is very poisonous, and being odorless, its use commercialy or industrially is dangerous. The danger has been at least partially overcome by the addition of highly aromatic compounds which instantly warn of the presence of leaks.

The principal use of blue water gas is in the manufacture of carburetted water gas, which is merely blue gas enriched by oil which is decomposed in the process of manufacture, resulting in the addition of various hydrocarbons of high calorific value. It is these constituents which cause carburetted water gas to become luminous on ignition.

Blue water gas is also used largely for mixing with coal gas and, in some cases, with natural gas, to augment city gas supplies. It is used industrially in many plants which require gas of high flame temperature, particularly for welding purposes. In addition to the foregoing, it is being utilized to some extent in the manufacture of various alcohols, solvents and even motor fuels. There are at least two plants now in operation in the United States which are engaged in the manufacture of such chemical products from water gas and natural gas.

The fundamental reactions governing the formation of water gas are:

(1) $C + H_2O = CO + H_2 + 56{,}718$ B.t.u.

(2) $C + 2H_2O = CO_2 + 2H_2 + 38{,}466$ B.t.u.

in which the heat quantities are based on H_2O remaining as gas, and are expressed in B.t.u. per Lb. mol.

It will be noted that both reactions are endothermic; that is, heat must be added to maintain the reaction, and since it is not practical to add this heat from external sources, in the actual process of water gas manufacture, it is customary to stop the production of gas when the fuel bed has fallen to a predetermined temperature and then to blow air through the fuel bed instead of steam. This raises the temper-

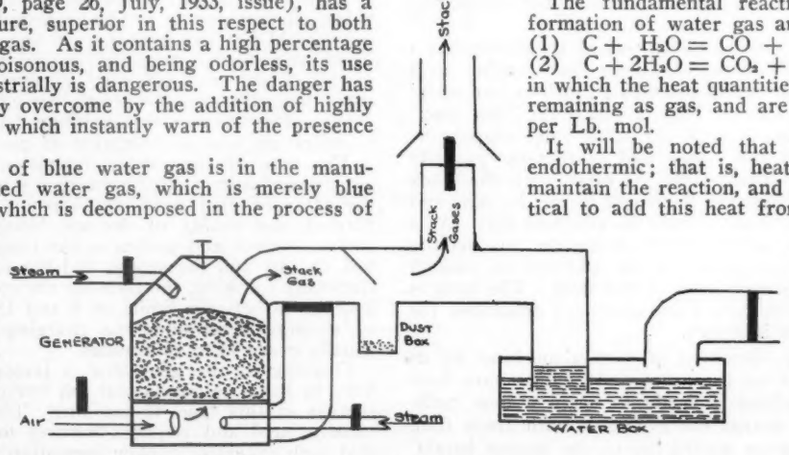


Fig. 5—Flow of Gases and Position of Valves during Air Blow.

ature of the fuel and stores sufficient heat in the fuel bed and in the walls of the generator to effect the necessary decomposition of the steam, when steam is admitted.

The manufacture of water gas is therefore an intermittent process, giving ordinary producer gas during one part of the cycle and water gas during the other part, the water gas being collected separately. The heat which has to be supplied in the foregoing manner is not lost, since it reappears in the combustion of the water gas.

Typical analyses and properties of blue water gas will be found in table 5, page 26, May, 1933, issue and table 9, page 26, July, 1933, issue.

Essentially, a blue water gas set consists of a generator, a source of steam, and a source of air, together with all the necessary valves, traps, piping, charging apparatus, etc. The generator usually consists of a steel shell, lined with fire brick, and varies in internal diameter from about 3 feet to about 10 feet. The charging door is gas tight and is located at the center of the top of the generator. The fuel bed is supported on grates, and provision is made for cleaning the grates at regular intervals, through gas tight swinging doors on a level with the grates.

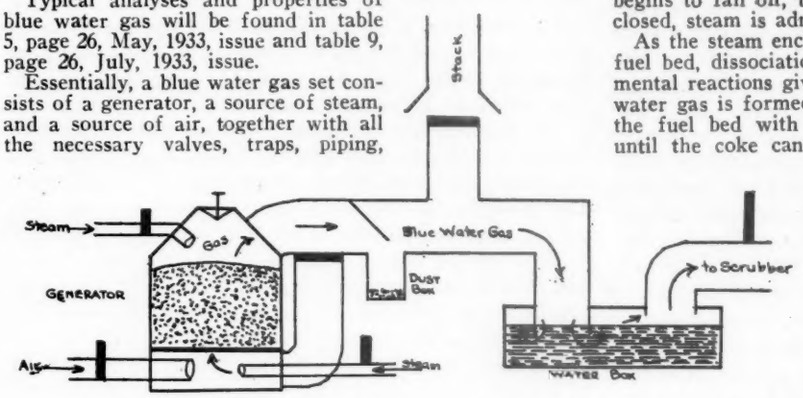


Fig. 6—Flow of Gases and Position of Valves during Up Run.

An air inlet is provided below the grates, and steam inlets are placed both above and below the fuel bed. All inlets are fitted with quick-acting valves. There are two discharge openings for the products, one near the top of the generator and one near the base, both leading to a common header and fitted with the necessary valves. The master valve on the discharge line is called the "hot valve." Beyond this, a trap is generally provided for collecting dust, cinders and fine particles of fuel which are blown through with the gases.

After leaving the dust trap the discharge pipe is again divided, one branch going to the stack and the other leading into a scrubber. The branch leading to the stack is fitted with a "stack valve" which is of course closed during the gas-making period.

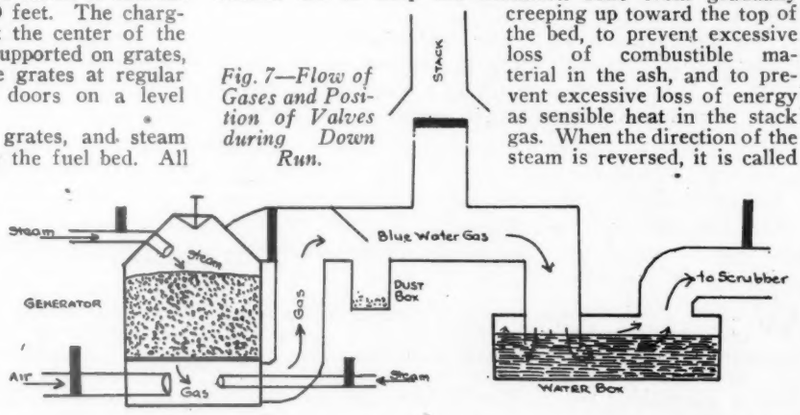
The pipe leading to the scrubber, which is nothing but a tank partially filled with water, enters the scrubber in a vertical position from above, and dips an inch or two under the surface of the water. This is called the "dip pipe." When gas is being made, with the stack valve closed, the gas escapes through the water and is thereby partially cooled and cleaned. During the air blast, with the stack valve open, a partial vacuum is created in the dip pipe and the water rises in it, thus forming an effective seal. As a great deal of water is evaporated during the gas making operation, provision is made for the addition of enough water to keep the proper level in the tank. The tank is customarily fitted with valves and auxiliary apparatus for draining it at regular intervals.

To understand the operation of such a machine, let us start from a point after the ashes and cinders have been removed, and everything is ready to begin a new cycle. The first step is to charge the generator with fresh fuel, in the form of coke or anthracite, to the proper height. In American practice, the fuel bed is usually 7 to 9 feet deep. The stack valve is opened, and next the air valve is opened, admitting the blast below the grates. The hot valve is of course closed. The generator now acts as an ordinary producer, and the reactions which take place are the same as those previously described under the heading "Producer Gas." There are the same zones of oxidation, reduction, etc., except that there is no distillation zone since we are using coke instead of raw coal. After the blow has proceeded until the heat stored in the fuel bed begins to fall off, the blast is shut off, the stack valve is closed, steam is admitted and the hot valve is opened.

As the steam encounters the incandescent portion of the fuel bed, dissociation takes place according to the fundamental reactions given in a preceding paragraph and good water gas is formed. Heat is very rapidly absorbed from the fuel bed with consequent reduction in temperature, until the coke can no longer completely decompose the steam, and the proportion of CO_2 formed increases as the steam decomposition decreases. Finally, so much heat is carried off by undecomposed steam, and the fuel bed becomes so reduced in temperature, that the gas making operation is stopped. The hot valve is closed, the stack and air valves are opened and air is again blown through the bed. The operation just described is called the "up run."

In actual practice, at some time during the run, the direction of the steam is reversed, passing through the fuel from top to bottom, the hot valve being adjusted to suit. The reasons for the change of direction are to keep the oxidation zone from gradually creeping up toward the top of the bed, to prevent excessive loss of combustible material in the ash, and to prevent excessive loss of energy as sensible heat in the stack gas. When the direction of the steam is reversed, it is called the "down run." The down run is not made on a fresh charge and it is customary to omit the down run just before cleaning. A down run should never follow a blow, as dangerous explosive mixtures are formed below the grates. It is also essential that the down run gas should not get into the air line through a leaky air valve, or a similar dangerous condition is produced. Some machines are provided with a vent pipe behind the air valve, which is opened when the air valve is closed and vice versa. The blower, when idling, supplies sufficient air to sweep out any accumulation of gas in the air line.

Fig. 7—Flow of Gases and Position of Valves during Down Run.



The time of the various operations is all arranged in accordance with a predetermined schedule, depending on the class of fuel used, the amount of ash and clinker formed, the quality of the gas being made, the air and steam volumes and pressures, the temperatures of the fuel bed, the air and the steam, and the size of the generator. Generally speaking, the time for the complete cycle of blow and run is between limits of 4 and 15 minutes. The rate of running determines the charging periods, which are usually every 45 to 75 minutes.

Cleaning of the generator is important and is usually done by hand, as mechanical ash removers have not been a success in this type of machine. The clinker formed is usually hard and requires barring to break it down, so that with excessive clinker formation the time of cleaning may easily amount to an hour or even more.

Technical Digest

ELECTROLYTIC CORROSION IN GAS MAINS

Laboratory experiments are described in which measurements of current intensities on various parts of the surface of a pipe embedded in moist soil or liquids are determined by means of metallic search electrodes. The results obtained agree with values derived from a formula of Michalke. All tests were made after a polarizing current had been maintained for not less than 24 hours, as the electrode currents are not constant in the initial periods. The method has been applied to the testing of pipe coatings. A large electrode current indicates the presence of a defective spot directly opposite the electrode position. The initial fall in the current intensity value of protected pipe embedded in sand is due to the formation of a hard layer of iron salts, which increases the electrical resistance. The results obtained with various commercial coatings are given. Measurements at low temperature and under vibrational stress show that the life of the protective coatings is lowered by these factors.

—W. Beck. Gas World, 1933, volume 98, pages 584 to 594.

HYDROCYANIC ACID IN COAL GAS

In the Drehschmidt and Feld method up to thirty per cent of the hydrocyanic acid absorbed by the ferrous hydroxide suspension may be converted into thiocyanate, which is not reconverted into hydrocyanic acid in the subsequent distillation and part of which may be completely lost by volatilization of hydrosulfocyanic acid. The formation of thiocyanate is attributed to the presence of oxygen in the gas which liberates sulfur by oxidizing the ferrous sulfide formed from the sulfuretted hydrogen in the gas, the sulfur then combining with the hydrocyanic acid. Accurate results were obtained by this method when the gas contained less than half a per cent of oxygen. Further study of Gluud and Klempt's method has shown that boiling with tartaric acid does not completely decompose the thiosulfate in the solution. The method has therefore been modified. The solution is boiled to remove ammonia and sulfuretted hydrogen, filtered and an aliquot part of the filtrate is acidified with sulfuric acid or nitric acid (three cubic centimeters of 5-normal acid to 100 cubic centimeters). The solution is then boiled gently for fifteen to twenty minutes, and after being cooled its thiocyanate content is determined by titration with tenth normal solution of silver nitrate in the usual manner. The error due to the formation of thiocyanate by interaction of the carbon disulfide in the gas with the ammonium polysulfide in the solution is negligible.

—W. Klempt and W. Riese. Brennstoff Chemie, 1933, volume 14, pages 21 to 25.

REMOVING PHENOLS FROM GAS LIQUOR

Activated carbon has been proposed for the removal of phenols from crude ammoniacal liquor. The process is claimed to be efficient, but it has been found that steam treatment for regeneration is too expensive in view of the high boiling point and the presence of tar. Hence, benzene is used for washing the carbon and then the phenols are recovered. The residual benzene is then removed with steam. Description is given of a plant working in the Ruhr district of Germany on this process. The liquor, which is freed from tar in a separator packed with iron filings, enters one of two or three adsorbers of iron with internal protective lining, being heated to a temperature of 60 to 65 degrees C. by the hot benzene. The working period for an adsorber is four hours and the activated carbon then contains 7.5 per cent phenols. The washing efficiency under these conditions is 99.5 per cent. The gradual accumulation of tar and resins renders it eventually necessary to regenerate the activated carbon. The benzene used for washing is also brought to a temperature of 60 to 65 degrees C. and is fed downwards, acquiring a mean phenol content of 1.5 per cent, so that one part of benzene is required for eight parts of the liquor. It passes through a water separator to the still. Costs are also discussed in the article, but the process is designed to avoid effluent difficulties rather than as a source of profit.

—F. Sierp. Das Gas und Wasserfach, 1933, volume 76, pages 105 to 109.

FLOW OF GAS IN LONG DISTANCE MAINS

Extensive investigations were made on the pressure losses in a long distance main. The mains have a large diameter of 8 inches, 7 inches and 6 inches. The total length of the system was about 53 miles. It was found that the pressure loss may be represented by a formula of the Chicago type, provided that appropriate values are employed for the friction factor. It was also found that the friction factors for gas and air are the same at relative velocities of gas to air equal to 1.54 to 1. The quantity of gas which passes through an iron tube of given diameter and length with a given pressure drop is approximately 2.5 per cent less than passes through a corresponding steel tube or pipe. The friction factor, though depending on the velocity of the gas, was found to be independent of the actual pressure of the gas.

—J. Coudeville. Journal des Usines a Gaz, 1933, volume 57, pages 359 to 360.

CAKING PROPERTIES OF COAL

"Caking" refers to the agglutination of coal in the laboratory test. "Coking" refers to the quality of commercial coke. Coals have been extracted with solvents under atmospheric pressure and resolved in alpha, beta, gamma (1), gamma (2) and gamma (3) compounds, the solvents used being the usual pyridin and chloroform, while the gamma compounds were extracted with light petroleum followed by ethyl ether. The gamma (1) compounds were found to consist of resins, saturated hydrocarbons, and unsaturated hydrocarbons in the proportion 10.68:39.06:48.42. The gamma (2) and gamma (3) compounds consisted principally of resins, gamma (2) being principally acid resins, resinols and ester resins and gamma (3) chiefly resene resins. It is concluded that the gamma (1) compounds exercise the caking action, while the gamma (2) and gamma (3) afford the swelling action, gamma (3) being more potent than gamma (2). The strongly and weakly caking coals are differentiated by the gamma compound content of

strongly caking coals being mostly greater than ten per cent and of weakly caking coals less than ten per cent. The oxygen content of the alpha-compounds is believed to influence the coking property.

—T. Shimmura. Journal Fuel Society Japan, 12, 140-149.

QUANTITATIVE ANALYSIS OF COAL ASH

The Department of Scientific and Industrial Research of Great Britain has published the results of investigations made by J. G. King and H. E. Crossley on methods for the quantitative analysis of coal ash, designated Physical and Chemical Survey of the National Coal Resources No. 28. Considerable experimentation was carried out on various analytical methods proposed for the analysis of coal ash and the methods finally adopted are described. These pertain to the determination of silica, iron, titanium and aluminum, calcium and magnesium, manganese, sulphur trioxide, alkalies, and phosphorus. The various reagents required are listed and a bibliography is appended.

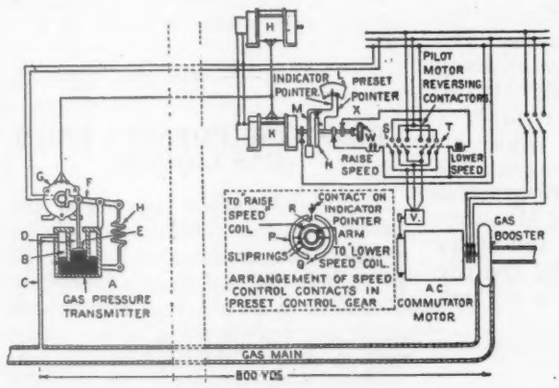
BY-PRODUCTS IN HIGH TEMPERATURE COKING

A study was made of the changes that take place in the composition of by-products during coking in high temperature ovens. The coke coal used contained 26 per cent of volatile matter and had a plastic range of 400 to 470 degrees C. It was carbonized in an oven 16 inches wide with an average flue temperature of 1440 degrees C. The coke time was fourteen hours. The liquid and gaseous by-products were collected by a sampling apparatus from the base of the ascension pipe, the rate of evolution of volatile products being measured (accuracy ± 5 per cent) by a Pitot tube inside the same pipe. The temperature of various parts of the oven and the rate of travel of the plastic layer are shown by thermocouple readings. Even after the first hour of coking, cracking is sufficient to ensure only high temperature products, there being practically no phenols in the tar and five per cent of naphthalene plus free carbon, while the gas contains 52 per cent of hydrogen, 35 per cent of methane and 4.6 per cent of unsaturated hydrocarbons. The high temperature conditions favor production of benzene with a little toluene and xylene. Between the third and eighth hour conditions give maximum benzene production without decomposition into hydrogen and carbon. After this, benzene and hydrocarbon gases all fall considerably in quantity, coinciding with the disappearance of the primary tar when the plastic layers meet about the eleventh hour. Cracking reactions, except for a little cracking of the tar, occur in the charge, there being very little in the free space above the charge.

—S. W. Saunders and F. F. Smith. Gas World, 1933, volume 99, Coking Section, pages 40 to 43.

REMOTE CONTROL OF PRESSURE IN GAS MAINS

The system used is shown in diagrammatic form in the accompanying illustration. It works on an electrical principle. The gas pressure in the mains at the remote point is measured by means of a mercury U-tube and float mechanism (A). This



space is in communication with the gas main by way of the pipe (C). The center space (D) communicates with the atmosphere, and has a float (E) floating on the mercury surface. Pressure variations in the main will clearly cause a rise or fall of the float, which is coupled with a sector arm (F), the sector end being geared to a transmitter (G). The opposite end of the arm is steadied by a spring (H). Pressure variations in the main are thus translated into rotary movements of (G). This is a small machine having a three-phase stator and a two-pole rotor of the shuttle-wound type, which is fed from a single phase supply.

—Anonymous. Gas Journal, volume 202, 1933, page 410.

WATER GAS MANUFACTURE

Water gas installations, which consists of two or more generating sets, are operated with waste steam from the auxiliary machinery. A series of valves, each of which is connected with the steam working cock, stack valve, or blast valve of the corresponding generator, is so arranged that the exhaust main is automatically opened to atmosphere when no gas-making steam is required by any of the generators. If high pressure steam is also used, means are provided for preventing its flow through the exhaust main when the latter is open to atmosphere. Humphreys & Glasgow Ltd. British Patent No. 387,912, filed May 11, 1932.

DRY AMMONIUM SULPHATE

Some details are given of the new Fauser process for the production of dry ammonium sulphate which obviates the necessity for working with saturators, centrifuges and driers. The reaction between sulphuric acid (52 degrees Be. concentration) and gaseous ammonia is carried out in a cylindrical chamber, the size of which will depend on the desired output. In the atomized form, acid comes into contact on the counter-current principle with the ammonia gas entering through openings uniformly spaced around the sides of the chamber. Any non-reacted ammonia which is swept forward with the water vapor meets a stream of sulphuric acid in the scrubber which is fitted with Raschig rings. Complete neutrality of the salt formed is ensured by maintenance of the ammonia content of the chamber gases at a level which does not fall below 12 to 15 per cent. The product accumulates on the floor of the chamber from where it is removed by means of a traveling worm, arrangement being made for returning ammonia vapor to the scrubber. To obtain ammonium sulphate in a granular form which is convenient for fertilizer purposes, a little water is incorporated during discharge from the chamber and the very slightly moistened mass is dried in a rotary oven.

—Anon. Industria Chimica, 1933, page 1343.

Viscosity of Natural Gas

VISCOSITY is an important factor in solving many engineering problems requiring the application of fundamental theories and laws of fluid movement that confront the petroleum and natural-gas industries, states the United States Bureau of Mines in a recently issued technical paper, in which is described an apparatus and method for determining the viscosity of natural gas.

Until recently viscosity has been accorded relatively little weight in the solution of natural-gas problems, and few pertaining data have been published. However, research has shown that it is frequently desirable and often necessary to have a numerical value for the viscosity of the gas under consideration.

Laws Are Very Complex

The theoretical and mathematical treatment of the subject of gas viscosity and the laws governing its behavior are exceedingly complex, especially for natural gas. Accordingly, after giving reference to the available literature on the theory of liquid and gas viscosity, the authors, W. B. Berwald and T. W. Johnson, in clear and nontechnical language, have given a brief discussion on the viscosity of fluids; to show from the data of previous experimentors that the same general laws of fluid motion apply to an analysis of the flow of either liquids or gases; and to develop a method from these general laws of fluid motion for measuring the viscosity of natural gases sufficiently accurate and practical for use in natural-gas engineering work.

Most methods for measuring the viscosity of gas are exceedingly complex, requiring highly refined laboratory apparatus and considerable skill in operation and interpretation of results. The method used by the Bureau of Mines engineers is simple in design and operation, requiring no complex apparatus or special skill.

The apparatus consisted primarily of a 10.3-inch-diameter coil of $\frac{1}{16}$-inch-internal-diameter copper tubing 135 feet long. A small positive meter, which was calibrated frequently against a standard cubic-foot holder, was used to measure the volume of gas discharged at the outlet of the coil. The inlet pressure was measured with a 72-inch mercury manometer having a finely graduated scale; and the outlet pressure, which was held at approximately atmospheric pressure, was measured with a small water manometer. Moisture was prevented from entering the coil. The coil and meter were operated in a constant temperature bath. Operation of the apparatus consisted in maintaining uniform or steady rates of flow through the coil and observing corresponding pressures and rates of flow.

The method is based on the relationship between friction factor and the Reynolds "number" for flow of gas through circular tubing. The Reynolds "number" or "criterion" is the ratio, tube diameter multiplied by the density multiplied by the velocity divided by the viscosity of the fluid. A gas of known viscosity is used to determine the relationship for any tube of fixed dimensions. From this calibrated relationship and from the flow of natural gases of unknown viscosity through the same tube it is possible to calculate the viscosity of the natural gases. Dry air, the absolute viscosity of which has been well established, was used as a reference gas in calibrating the apparatus.

Indicated Experimental Error

The accuracy of the method has been checked by determination on gases of known viscosity. The indicated experimental error from a large number of determinations of the viscosity of air was approximately $\pm$ 1.25 per cent. Check determinations on the viscosity of nearly pure oxygen, nitrogen, and methane gave average results within $\pm$ 1.25 per cent of the most reliable and accepted values published for these gases. Additional check determinations on hydrogen and helium also were made in the apparatus.

Viscosity determinations at 60° F. and approximately atmospheric pressure were made on 25 natural gases of widely different chemical composition. The observed viscosity of these gases showed a maximum variation of approximately 25 per cent, or from 0.00000646 to 0.00000866 pound per second-foot, depending upon the chemical composition of the gas, which ranged from a "dry" gas of almost pure methane to a "wet casing-head" gas containing mostly hydro-carbon gases heavier than methane.

Results of experimental determinations on three representative natural gases of 40°, 60° and 80° F. indicated that within this range of temperature the viscosity increases approximately 7 per cent, depending somewhat on the chemical composition of the gas.

Determinations at High Pressure

Experimental determinations on the viscosity of natural gas also were made at pressures as high as 500 pounds per square inch absolute. The viscosity at these higher pressures was found to be approximately the same as that observed at pressures near atmospheric.

The data developed by Berwald and Johnson pertaining to the viscosity of pure gases and gas mixtures (including 25 natural gases,) and the effect of temperature and pressure on gas viscosities, have been presented in convenient tables and charts. In addition, the application of viscosity data to analysis of some gas-engineering problems is shown.

Copies of Bureau of Mines Technical Paper 555, "Viscosity of Natural Gas," by W. B. Berwald and T. W. Johnson, may be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C., price 5 cents in cash or post office money order. Stamps are not accepted.

Profitable Pointers

THERE are a great many gas men operating in the smaller situations who say: "These demonstrations have been over-worked. We have taken particular notice of the women who attend them from year to year; we have noted what they seem to be most interested in and then, we have checked the sale of ranges following these activities and we have found that they are not worth while. Our check indicates that our range sales are not increased enough to cover the expense of the demonstration. We find that the same women attend these meetings year in and year out and that the questions they ask indicate that their interest is mainly in the cost of the new type ranges or the cost of cooking."

Personally we think these men have made only a superficial check of the benefits to be derived from public demonstrations. It is quite possible that the same women do attend these activities year in and year out and that they are interested in the cost of the appliances being shown and demonstrated and in new methods of preparing and cooking foods. It is our understanding that is the reason for demonstrations—not immediate, direct sales.

Implant the idea that gas cookery is the quickest, cleanest, most expert and economical cookery in the housewife's mind, and then follow up users to see that they have modern gas ranges and understand them fully. It is that in our opinion, coupled with one or two big public demonstrations each year, that will keep gas cookery in the lead in any community. Here we should like to add that a great deal depends upon the demonstrator, and her ability to get over the desirable points of cooking with gas. The job just can't be turned over to anyone who may be able to prepare and cook tasty things. Get that idea straight. Your demonstrator must be able to sell GAS cookery.

1934 will be a very good year for the gas man who plans his work and works his plan. If you have not already constructed a merchandising calendar do so at once. On this calendar indicate what appliance you expect to push each month; show the type of promotional material you plan to use and tell how you plan to use it. This calendar should be constantly consulted and revised and added to as time goes on.

A THING that surprises me is that there are numerous men selling gas ranges who have no "gas runs" in their stores for connecting ranges. This means that they cannot make an actual demonstration of the range. This, to an old time gas range salesman, is the height of folly. We do not understand how they can get their story over—how, for instance, can they make the housewife understand and appreciate the value of the new type burners, the time and temperature control, etc.? If you do not have a range or ranges connected on your floor do so at once and see how much easier it is to get your story over. It might be well to suggest this to the dealers in your town too.

IN talking to a Commercial Manager who has been trying out various types of cooperative dealer advertising he told us that he had obtained best results when he went to the dealers with a plan whereby they (the dealers) paid a portion of the cost of the advertising. His plan, he said: "Is to have our advertising department make a complete lay-out and write the copy for not only our advertisement, but that of all dealers who are approached to cooperate. This is an idea. Folks usually appreciate the things that they have to pay for."

IT seems that the depression has given some sales executives a little more time to plan and study sales activities. These men being very hard pressed for new business and additional appliance sales have, it seems, hauled out, dusted off and in some instances built additions to plans that clicked in the days before easy selling.

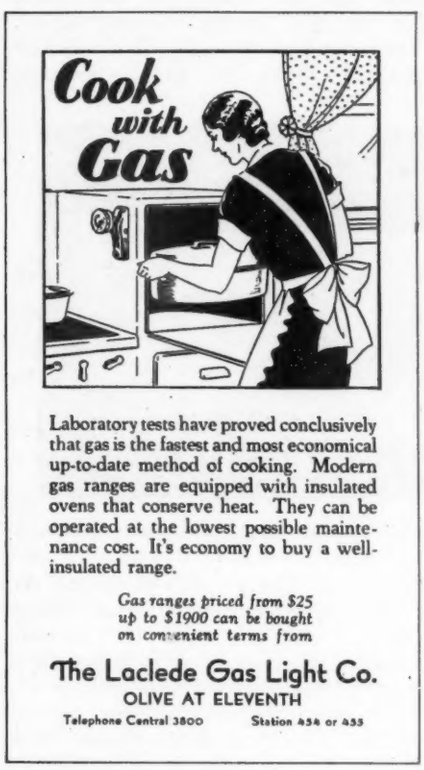
One type of activity that has at last been given an honest trial is the so-called "Employee Campaign." This plan of selling has been advocated in these pages many, many times with the admonition, "plan it carefully and *present it more carefully*. It is preferable that the presentation be made by the ranking executive of the organization or at least given his signed endorsement."

In one instance that came to our attention recently the principal of an operating company gave such an activity his approval by both a personal, verbal and written appeal. The managers under his jurisdiction then went out to accomplish the job set-up by the merchandising department—and the objective was accomplished by a larger margin than has been attained since 1929.

Another company that has done an outstanding job through employee sales cooperation is the Brooklyn Union Gas Company. This company has set up a plan that we understand will apply to the sale of all types of gas appliances.

"WHEN a man has enthusiasm he'll sell," said a man who has made a better than average income at selling for a good many years. "I know a chap who was employed by a gas appliance dealer in a southern city, who got so enthusiastic over a line of gas ranges that without any effort at all he made more sales than men who knew the town and had been classed as star salesmen for years. This young fellow was mechanically inclined and he got a thrill out of good workmanship on any appliance. To him a well made water heater, gas range, space heater, or what have you, was a thing of beauty and he got real enjoyment, pleasure—if you

understand what we mean—out of talking about such items to every one he came in contact with. Some of the boys watched him for a time and predicted, 'Oh, he'll get over it. The poor sap has to get used to these things; down there where he came from they were never heard of!' But he did not—today after several years of talking, demonstrating and SELLING appliances in that town, he is going as strong as ever, and not once during the past months has he complained or failed to make sales. The secret is obvious, he has been able to keep up his enthusiasm."


Cook with Gas
Laboratory tests have proved conclusively that gas is the fastest and most economical up-to-date method of cooking. Modern gas ranges are equipped with insulated ovens that conserve heat. They can be operated at the lowest possible maintenance cost. It's economy to buy a well-insulated range.
Gas ranges priced from $25 up to $1900 can be bought on convenient terms from
The Laclede Gas Light Co.
OLIVE AT ELEVENTH
Telephone Central 3800 Station 454 or 455

HERE'S a good idea that came from the middle west some time back. The Laclede Gas Light Company, St. Louis, used the insert illustrated to keep that old cooking load. Don't you agree with us that here's money well spent? We have to keep those sixteen million home managers sold on gas cooking and sell the million crop that is coming and inserts of this kind will be a mighty big help.

NOT long ago an advertising man told me that he was growing stale. He said when writing institutional copy he seemed to get along o.k. and that the same thing applied when he was writing a range ad. "Water heaters," he said, "get my angora. I seem to have run out of ideas for water heater ads."

I suggested that he haul out "Ruud Hot Water Service," saying that in my opinion it was an unending source for ideas for advertising Hot Water Service. It seems to me that a great many so-called water heater advertisements are mere *hooey* and that as an industry we should advertise *Hot Water Service* to sell water heaters.

As a suggestion why not use a hand lettered heading for one of your ads—*Picture Your Hot Water Faucets Telling the Truth.*

PROSPECTS are always available to the gas man. The customer's ledger is a veritable gold mine of prospects. A careful analysis of the ledgers of any gas company will uncover any number of prospective purchasers for what have you—everything from gas ranges to gas refrigerators. When folks have just completed the payments on a purchase it is a mighty good time to sell them again. They have learned through time payments how to have what they want and still keep the old family budget intact. January is a good month to work-up a list of prospective purchasers from the customers ledger and a good month to find the home manager at home, with a little Christmas money in her purse.

A GREAT many gas men found that carefully prepared direct mail advertising was profitable during 1933. Without exception these men report that this type of promotion material was given their full support; that is to say, their plan called for a salesman's follow-up on the mailings. Direct mail like any other type of advertising is simply a sales help and it is most profitable when it is properly supported by a timed follow-up by a salesman. Plan to do this this year and you will be pleased with the returns you receive from your investment.

WAY BACK, and, at that, not so long ago, when gas men decided to "get business" they went after it like they meant it. Look at the two advertisements we are reproducing here. We wonder what would happen if these men were on the job today and wanted to increase the load per domestic meter? As we view it, these fellows would use some sizable advertisements to tell the home manager what she was missing by not having a gas refrigerator, a laundry dryer and an incinerator.

600,000 Chicago Families
Have Charge Accounts
With the Gas Company
Christmas Presents that have a permanent value may be purchased in our Big Basement Salesroom or at any of our Branch Stores. Payments can be made in easy monthly installments on almost every article.
Portable Piano Lamps — full height, solid bear, handsome mahogany upright, with silk shade, range in price from $17.50 to $20.00. Small monthly payments.
Small Portable Lamps — to suit every taste and requirement. Very neat designs as low as $7.00. Small monthly payments.
The "Amber Glow" — The Chicago Home Light — $2.25, installed complete — monthly payments, 75c for three months.
Gas Irons — Double Point — burns about three cents' worth of gas in ten hours — never needs repairing, and will give first-class service for at least ten years — 5 payments at 75c.
Hot Spot Heaters — portable. Just the thing for a cold room or an extra cold day — $6.00. Monthly payments.
Touch-a-Button Lighter — a great convenience — lights any top burner instantly without the use of matches — can be attached to any gas range. Price $1.95 — 4 monthly payments. An all-the-year-round delight to the person who cooks your meals.
The Peoples Gas Light & Coke Company

Dramatizing Kitchen Convenience

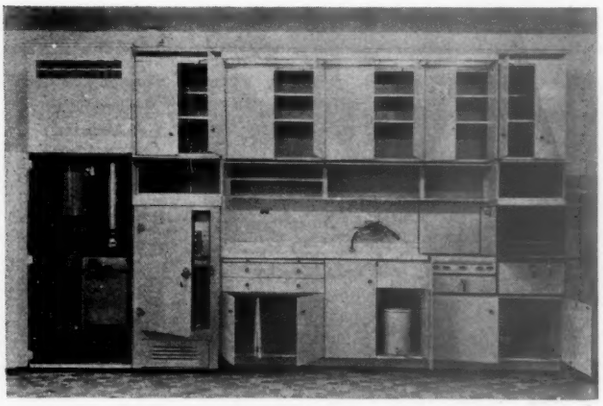
THE executives of the Brooklyn Union Gas Company were seeking for some way to dramatize their home service department and the business of homemaking. They wanted women to stay at home, do more home cooking and build up the gas load with automatic gas appliances. They decided to make an analogy between their home service demonstrations and the theater. This, they figured, would introduce the thought that there IS drama in the business of homemaking.

The White Kitchen Compact made it possible to carry out these very clever promotional ideas. A White Kitchen Compact was installed on the stage of their auditorium, set up in a straight line so the demonstrator could do her work in plain sight of all the women in the audience. A complete kitchen and house heating unit is before the eyes of these women every minute. Every minute they have an opportunity to compare the last word in modern gas equipment with the equipment in their own homes. Every minute that those women are in the auditorium there is a subtle undercurrent that is selling them modern automatic gas service.

The enclosed photographs will show how they presented the demonstration work with the White Kitchen Compact. The women file into the hall to find a curtain across the stage as in a regular theater. Then the demonstrator steps out from behind the curtain and makes her announcement with nothing but the plain black velvet curtains to detract from the interest in her and in her message. At last the curtain is drawn back for;

Time: Today.
Setting: The White Kitchen Compact.
Characters in order of their appearance:
Home Service Demonstrator .....
Director of Gas Servants
Automatic Gas Refrigerator .....
Automatic Gas Servant
Automatic Gas Water Heater ....
Automatic Gas Servant
Automatic Gas Range .....
Automatic Gas Servant
Chocolate Pudding .....
Child of Automatic Gas Servants

This method of selling the *result* of modern automatic gas equipment instead of the equipment itself gives the women a chance to sit there and see for themselves how entirely new is the White Kitchen Compact, to plan how they would arrange the different units to fit into their own kitchens and their own tastes. As the demonstrator works they can see that the whole kitchen takes up very little space (125" for the kitchen units and 30" extra for the house heating and water heating unit). They can see that it is all metal and has no cracks for dirt to lodge—they know that a damp cloth will do most of the cleaning for them. They are told that the finish is Vinylite, the new stain-proof, chip-proof surface. The whole dramatization of the White Kitchen Compact, by its radical departure from conventional kitchen equipment and its complete kitchen condensed in such a small space, adds excitement to kitchen work and leads the women in the audience to believe that they have sold *themselves* on modern automatic gas service. Believing that they have sold themselves, they offer little resistance to the thought of using more gas service in their homes.



Kitchen Compact Open.

Demonstrator Opening Gas Refrigerator.

Modern Boiler Firing

THE maximum heat liberation from a gaseous fuel is obtained by thoroughly mixing it with the chemically correct proportion of air and burning it in a tunnel whose catalytic action promotes immediate combustion, according to D. W. Frye of the Equitable Gas Company, Pittsburgh, Pa. With this arrangement carbon monoxide will not form nor will unburned gases be present in the flue products. Thus, fuel losses from these causes can be eliminated. With automatic proportional mixing equipment, the respective volumes of air and gas are under control at all times, preventing fuel loss due to excess air.

With this system a higher fire-box temperature is possible, causing more rapid circulation of water in the tubes and a correspondingly lower temperature in the lower ends of the tubes in the last passes; all of which tends to reduce flue gas temperature. There is no flame impingement on the tubes, allowing longer tube life; and the problem of the deposition of carbon on the tubes disappears.

Diaphragms

Leather Characteristics and Defects, and Consideration of the Value of Various Oils and Dressings for Meter Diaphragms, —with Some Observations on Synthetic Materials for Keeping Leather Soft and Flexible.

By ROBERT L. KLAR

Engineer, Des Moines Gas Company

(*Continued from January issue*)

IN bark tanning, the fibres of the leather are plumped and as a result the bark-tanned skin is firmer than the re-chrome-tanned skin. Due partially to the agitation in chrome tanning and partially to the fact that the fibres are shrunken in chrome tanning, the semi-chrome and the full chrome tanned leathers are not as firm as the bark-tanned leathers. The difference can be adjusted in the case of bark-tanned and rechrome to a large extent by varying the fat liquoring process. The full chrome leather, which is white or light greenish in color, is too limp to use in a tin meter diaphragm and is hardly satisfactory for any other kind of a diaphragm. Often with rechrome leather it is necessary to choose a leather from 0.2 to 0.3 mm. thicker than bark-tanned leather in order to get the required firmness.

Defects in Sheepskin

There are various defects to which sheepskin is subject, some of which are very evident to casual observation. Scratches and cuts, of course, result in scars. Just as with human scars, the scar in the leather is rather tougher than the rest of the skin and care must be taken that this extra toughness does not occur at a place where the folding is to be done, otherwise the leather is apt to wrinkle and wear out in parts. Naturally and fortunately, the scars are more common in the larger size skins. In the larger size meters in which these skins are used there is less folding and, consequently, the scar is often negligible.

The peculiar thing necessary to remember is that this vital part of the gas meter is entirely dependent upon a proper selection of a material that is a product of nature without uniformity, and that the control necessary for this finished product depends entirely upon the human senses. In comparison, most of the other basic materials can be fabricated through strictly scientific processes without much variation.

Sheepskin Characteristics

Sheepskin, of course, is a more flabby type of leather than calfskin or cowhide of similar thickness. This is because the sheepskin has a looser grain. Sheepskin, in general has more fat in it than other leathers. During the tanning, this fat is washed out and in extreme cases what is known as loose grain results. This is characterized by an open space in the center of the leather, amounting sometimes to almost a separation of the grain and fleshy sides of the leather. It is more common on the belly but in extreme cases will cover most of the skin. The chief trouble from this defect comes at seams whereby gas can leak through the stitch hole to the center of the leather and leak through this open space to the other side of the diaphragm.

Of the two types of leather that are principally in use, bark-tanned and rechrome, the bark-tanned is by far the oldest, both in production and in utilization in meters. Rechrome leather was first used in London in 1913 and is extending its use widely in this country. In locations where a gas contains corrosive constituents, it is far superior to bark-tanned leather. It may be noted that the corrosive constituents do not act directly on the leather but instead through the metal of the meter. The corrosion products of iron, when absorbed by bark-tanned leather, seem to tender it, to use a tanner's term. Rechrome leather, however, does not absorb aqueous solutions at all rapidly and it is probably this quality that is responsible for its better action in corrosive gases.

During the last five or six years considerable experiments have been made with diaphragms made of chrome retanned or semi-chrome tanned leather. The selection of skins in the pickle is the same as for bark tanning. The leather is first tanned in the same manner as bark and is then retanned in a chromium salt solution. It is then put through the same process of finish and selection as the bark tanned leather. This type of leather has been used long enough and under enough varying conditions to recommend its use where gas conditions are not favorable or particularly where climatic conditions tend to produce a combination of heat and moisture.

Desirable Type of Tanner

The tanner must have a capacity to put through a large number of skins to get the desired sort for meter leather. We also feel that a tanner who maintains close contact with the meter manufacturer and who understands our problems and co-operates

Read before Mid-West Gas School and Conference, Iowa State College, Nov. 13-16, 1933.

fully, is more likely to be of a desirable type than one who sets up arbitrary rules for the meter men to follow.

A test that has been widely used in tannery work has had some use in meter work. It is a test for completion of tanning by the chrome process. In order to make sure that the chrome tanning process is completed, a small regular section is cut out of each of the rechrome skins and boiled for five minutes in water. It is then checked for shrinkage. The skin and the sample cut from it are marked with a number and if any shrunken testing sample is found, the skin is immediately picked out and rejected. It is often desired to differentiate between rechrome and bark-tanned leather and this boiling test is the surest way to make the differentiation.

In an unoiled condition rechrome leather is not as red as the bark-tanned leather, the color apparently being something of a mixture between the brown of bark-tanned leather and the light greenish-gray of full chrome tanned leather. When oiled, bark-tanned leathers are translucent, while rechrome-tanned leathers are black and opaque, possibly due to the metallic content of the leather. However, bark-tanned leather that has been in service often becomes dark in color due to the absorption of small amounts of iron salts and when this occurs, the only sure test is the boiling test described above. Bark-tanned leather will curl up instantly when it touches the boiling water and when removed from the water and dried, will be hard and brittle.

Uniform Thickness Important

In cutting the skins to make diaphragms, attention must be paid to getting a piece of leather of approximately the same thickness. It is customary to cut diaphragms lengthwise of the skin as there is far less change in this direction than there is across the skin. It is not uncommon to see skins that are 0.5 or even 0.7 mm. thicker at the neck than at the belly, and when a two-piece diaphragm is made, care should be taken that the leather of the two pieces is approximately the same thickness. The same thing applies to two diaphragms to be used in a meter. If one is softer than the other, the action will be somewhat irregular.

All leather, of course, is porous and for use in meter diaphragms it must be treated to remove the porosity and also to provide a means of lubrication to prevent its wearing out in service. Leakage through oiled leather of the thickness used in small meters will not occur until there are 13 to 15″ of water differential pressure on it, and inasmuch as the pressure drop across a meter running at its maximum safe operating speed will never exceed 2 or 3″ of water, the oil imparts sufficient tightness to the leather.

Not only has there existed much misunderstanding and misinformation in regard to the desirable characteristics of the leather for meter diaphragms, but there long has been a wide divergence of opinion with regard to the composition of the oil best adapted for use in this leather. Much of this difference of opinion may be attributed to a lack of knowledge of the fundamental principles governing the situation.

Selecting Diaphragm Oil

In selecting a diaphragm oil, it must not be so viscous as to interfere with the flexing of the leather and must not be thin enough to run out of the leather easily. There are about thirty oils used in fat liquoring leather and about a dozen of these have been used in various mixtures of meter diaphragm oils. The principal ones are neatsfoot, sperm, rape seed, cod, castor, olive, and mineral oils and often small amounts of wax-like materials such as beeswax or paraffin or degras. The mixtures that have been used are, at times, rather bewildering, and it is the opinion of gas company laboratories that there is very little difference between any of the oils. For any oil of a particular type, a more viscous dressing stays in the diaphragm longer than a thinner dressing.

All of the oils mentioned, except castor oil, are soluble in the condensate of manufactured gas or of natural gas. Castor oil is soluble in manufactured gas condensate and is soluble to some extent (sometimes up to complete solubility) in gasoline. Consequently, it would seem that no one oil would offer any particular advantage over any other in resisting the bleaching action to which diaphragms are subjected in some localities.

There are many peculiarities in this bleaching process, however. One of them might be of interest. We are experimenting with a diaphragm dressing which is soluble to an extent of about 25% in petroleum ether, which is a light grade of gasoline. It is completely soluble in benzol. However, samples of leather treated with this oil lose far less oil in a gas saturated with benzol than do samples treated with any oil of similar viscosity. We are trying to find out the reasons for this, although as yet we do not know an explanation for it. Bark-tanned leather and rechrome leather are affected equally in the bleaching action.

A mixture of oils may be particularly adapted for use in certain kinds of leather where the leather is exposed to atmospheric conditions only. It does not follow that such oils are suitable for use in the delicate leather of a meter diaphragm, which is not exposed to the atmosphere, but must withstand the peculiar oil-absorbing qualities of the average manufactured gas.

Another reason tending to produce a difference of opinion in regard to the best oil for the purpose has been the varying character of the leather in which these oils have been used. It is somewhat astonishing what a wide variation there has been in the use of different types of leather, or so-called leather, and it is little wonder that the resulting opinion is not more uniform. Admittedly the oil to use is such as will tend to preserve the leather in its original state for a maximum length of time, and resist most successfully the action of the gum-forming and corrosive impurities carried by the gas. Long research and study have been given toward the attainment of this desirable result. From oil mixtures commonly and often indiscriminately used in leather manufacture, study and experience have led to a mixture of greases and oil particularly adapted for use in a gas meter diaphragm.

No Oil Perfect

One distinct advantage in the study of oil is to use one kind of leather from one source. Therefore, it has been solely a question of finding oil best adapted for use in this leather. The first point has been to know that the oil is free from acid or other destructive agents, thus tending to keep the leather flexible, strong and durable. The second point has been to have the leather retain the oil for the longest possible period of time.

After all the years of research, it must be frankly admitted that no oil or combination of oils has been found that will absolutely withstand the action of all combinations of gases or temperature changes. We have gone a long way in prolonging the effect of all gases on diaphragms and have every hope that soon this problem may be solved.

Even the best selection of leather or the best known oil formulas will not prevent certain gases from af-

fecting the original status of the diaphragm and eventually in changing the original proof-test of the meter.

It has been stated before that the rechrome leather is a superior leather for use where the gas contains corrosive constituents. It is, however, slightly more expensive than bark-tanned leather and there are a great many localities, in all probability, where the extra expense is not warranted. Probably most natural gas services for which the gas has been transmitted over long distances by pipe line can use bark-tanned leather with perfect safety, while a manufactured gas system, that does not take particular care to remove all the condensates from the gas, would do well to use the rechrome leather.

Synthetic Dressing Possibility

The question of diaphragm dressings, unlike the matter of diaphragm leather, is not at all settled and if we can not find a dressing that will stay in leather and keep it soft and flexible it may be that we can turn at some time to a synthetic material. As I am noting in a report to the American Gas Association Meter Committee that was available at the Convention, there are three materials that seem to offer some promise.

One of them is Thiokol, which is absolutely resistant to gasoline, and more resistant than any other synthetic plastic we have found to benzol, such as is encountered in manufactured gas condensate. However, Thiokol is difficult to work and it has a tendency to cold flow; that is, to relieve pressure on itself by distorting itself. The action in a gasket would be that the Thiokol would squeeze itself out until it would no longer seal, unless retained in some way. Because of this property Thiokol can not be used by itself as a diaphragm material and it is impossible to incorporate it in a fabric thin enough to be suitable for diaphragm work. The thinnest Thiokol-coated fabric is approximately 1/32" thick and altogether too stiff to be considered suitable as a diaphragm material.

Another material is known as Duprene. This is a sort of a cousin to rubber, but is much more resistant to solvents than is rubber. The effect of gasoline on it is not at all considerable, although benzol will destroy it. However, when it is coated in a thin sheet on fabric the effect of benzol is not noticeable. Unlike rubber, however, it cannot be made of varying degrees of flexibility and the diaphragms that have been made from it are rather too elastic to be used in diaphragm work. The DuPont Company is interesting itself quite extensively in the subject and it is possible with their research facilities a suitable material may result.

The third material is Glyptal, which is not yet in production in a form suitable for meter diaphragms. Its resistance to solvents is much the same as Duprene, though, possibly, a little greater. It has a peculiar property of what I have been calling a delayed elasticity. In other words, if a sheet of it is pulled out, it will return to its former shape, but not instantly, sometimes taking as much as an hour to return. This might be a desirable feature for diaphragm work though probably, as with Duprene, it will be necessary to coat it on fabric to support it, a sheet of the pure material being too stiff for diaphragm use.

I wrote for additional information from one manufacturer and this is the reply:

"Since returning from Chicago I have looked over the information we have on the changing of dimensions of leather and I am sorry to say that the changes are so slight and our tests so few that we do not believe it advisable to give them out until there has been more confirmation of them. We do have enough information, however, to indicate that leather does change its dimensions and physical state under different gas conditions, but how much and under what conditions we are not yet prepared to state.

Flattening Insignificant

"I was fortunate in being able to talk with one of the sources of our supply of sheepskin and was informed that photomicrographs which they had, showed no difference in the structure of skin in points where it had been flattened more than at other points and we can, accordingly, consider that the leather has no difference because of this flattening.

"Examination of tests of meters that we have made over the last several years indicates that diaphragms made by blocking the leather, in other words, stretching it into a definite shape, are not enough different from those made without stretching the leather to say that the blocked leather had any tendency to return to its original shape.

"As you stated in Chicago, when wet leather is dried it is stiffened, but such stiffness is overcome by flexing it. A diaphragm in constant motion should not, accordingly, undergo the

(Continued on page 38)

BESSE, OSBORN & ODELL INC. · COLONIAL BRAND · BOSTON, U.S.A. · RE-CHROME METER LEATHER

Used by many of the large Gas Companies and Meter Manufacturers.

Besse's leather is fully hemlock bark, pit tanned and naturally dried. We leach our bark in our Maine tannery. It takes us a minimum of five weeks to tan our leather.

RECHROME METER LEATHER

After this leather has been fully tanned in hemlock bark, we then reprocess it into Rechrome Meter Leather, which leather has proven so valuable to many gas companies.

RECHROME LEATHER

will stand up in the meter under all variable conditions, heat, cold or dampness, without affecting the diaphragm in any way.

We unqualifiedly recommend its use by all Gas Companies

BESSE OSBORN & ODELL, INC.

51 South St., Boston, Mass.

Tanners of "Colonial Brand" Oil and Re-Chrome Meter Leathers

New York Representatives
G. N. BANKART—W. A. SMITH
177 William St., New York City

The Pitfalls of Advertising and Advertising Men

By G. W. ALLEN
Secretary-Treasurer, Canadian Gas Assn.

"WEAKNESSES in present-day advertising, and in advertising men," might well have been the title of this paper, which has for its object the pointing out of some of the economics of this particular profession.

Of pitfalls there are many. There are thousands of things every advertising man has to beware of, and thousands more of what not to do, if we are to be more successful in our chosen work. I do not intend to mention more than but a few of the things that tend to make our advertising less effective than it should be, but trust what are mentioned will be of vital worth to each of us here today.

It is now some 35 years since my first entry into the field of advertising and selling, and in this long time one has had a splendid opportunity of seeing many things that ought never to have been done, and that were done by men who should have known better.

The Job Is Not Easy

To some, the advertising man's job appears to be an easy one. It is not an easy job, and never will be. There are, of course, thousands of would-be advertising men, who think the job a simple matter of penning some very smart phrases to be set in some form of hieroglyphical setting, at so much per agate line. But, to the man whose very job depends on his ability to produce advertisements, and carry on campaigns that produce profitable sales, it is indeed a serious business.

I do not pretend to be any better than other advertising men, but there are a few things I have learned in the course of 35 years' contact directly or indirectly with the work that has made me extremely sceptical of many of the methods that have been adopted by some advertising men as means of so-called profitable publicity which are not worth the paper they are written on. Hardly a utility company exists that has not spent considerable money each year on some form of publicity which on a pre-analysis would have shown itself to be valueless as a business builder. Many advertisements, pamphlets, booklets, and other types of literature are prepared and distributed annually that have fallen far short of being read by the average man or woman into whose hands they have come.

Even at this late date I know of men sitting as directors of publicity for public utility and other companies who know practically nothing about advertising in the way it should be known, and those who employ them even less so, concerning what constitutes good and effective copy, and what are the best means of presenting it to the buying public.

Philadelphia Gas Works Company Demonstrates in an Actual House on Their Sales Floor.

Serious Thinking in the Offing

Now, gentlemen, this sort of thing should not be. It is not my thought to imply that none of us know what constitutes good advertising, and the means for its preparation, for there are many good advertising men in our utility companies. Some are here today who do know, and who have for many years been preparing splendid material that gains attention and wins permanent and profitable business, but there is room for much improvement even among the best of us, if we are to continue to hold our jobs and to win favorable mention in the new era of prosperity about to dawn upon us.

The depression through which we have been passing has been a lesson

Read before Publicity and Advertising Section, American Gas Assn. Convention, Chicago, Sept. 25-29, 1933.

to many prominent advertisers, and to many of our utility executives. Some serious thinking has been going on of late in the minds of the men who pay our advertising bills, and the advertising man who hopes to hold his job for the next few years will have to prove his ability to produce advertising that will bring about a demand for the goods he advertises. It will not be an easy chair and plenty of scrap paper to scribble out what may appear on the surface to be a fair piece of publicity copy, but it will be real hard work, and real get-down-to-brass-tacks business.

Results Will Be Demanded

Advertising is going to be put under the magnifying glass in a manner it has never experienced before, and I can only say, woe to him who cannot produce the kind of advertising that brings results to the man who pays the bills.

It is not my intention to enter into any controversy over what constitutes good or bad advertising at this particular time, but more to take the time to point out what ineffective copy and weak advertising methods are actually doing to business, and what must be done if we are to overcome the inefficiencies in our methods.

The waste in advertising effort throughout the American continent alone is something terrific. No accurate figures are available to apprise us of what is our annual expenditure in all forms of publicity, but prior to the recent depression we could safely say the amount reached approximately two billion dollars. Taking the actual returns brought in as a result of many campaigns as a basis for our figuring, and keeping in mind the tremendous amount of publicity that actually fails to bring results, we are quite safe in stating that upwards of 80% of all money spent in an advertising direction was actually unfruitful, or to be exact, wasted.

Even the 20% that brought results, brought it in varying measure, and like the seed sown on the good ground in the scriptural parable, brought forth fruit, some thirty, some sixty and some an hundredfold. Personally, I am no more anxious to spend money on unfruitful advertising, than anyone else here today, but it is surprising how much does get away from us into channels that a little analysis would prove valueless. I want to see results from my advertising efforts, because I know when no good results follow, that something is wrong with my plans. I am not one to blame the sales department by saying it should have followed up the advertising in a more energetic way, even though I may know the sales department, by its cooperation can increase the results from my advertising efforts. But, as an advertising man, I want inquiries as a result of my publicity efforts and, if they fail to materialize, I want to know the reason why.

I don't expect 100% efficiency, or to get 50%, or even 25% returns from the money it may be my privilege to spend in a publicity direction, but I want results that at least pay for the advertising, plus my salary, and some over for my employer, or I get out of the business altogether.

Now, 80% of our average normal year advertising expenditures, on this continent, means the enormous total of something like $1,600,000,000 a sum which, to me, is inexcusably wasted, and I mean by wasted, that it has gone into that type of publicity that has failed to bring results to the degree expected.

Under normal conditions of business there are in this country something like 30,000 newspapers, magazines, trade journals, house organs, and periodicals of all kinds, that display some forms of advertising copy. These publications receive about one-half of the total amount spent annually in advertising. The other one-half goes into the great outdoor and supplementary advertising field which includes all kinds of outdoor publicity, posters, spectacular display signs and street car advertising; window display publicity; and into the other great fields which embrace mail-order and general catalogues, booklets, pamphlets, form letters, advertising novelties, and other forms of direct advertising, and in other directions.

A Tidy Saving

If we take for granted that a very high percentage of the advertising placed is unprofitable, in that it fails to bring even a 10% return to the advertiser, it is quite reasonable to suppose that any improvement that might be made in the general effectiveness of our appeals would result in a large economic saving in sales expense. If an improvement in the general effectiveness of our advertisements, and of all our advertising appeals, throughout every channel of advertising effort amounted to but five per cent of the total expenditure, it would mean the saving of at least $100,000,000 annually to the people of this country. Surely such a low percentage of increased efficiency in the effectiveness of our advertising appeal ought not to be beyond our abilities to achieve. It ought not to be a difficult matter for every advertising man to add five per cent more attractiveness and interest to his advertising efforts.

No advertising can truly be said to be 100% effective from a productive standpoint. It is rarely, if ever, that

Ray Martin of New York Consolidated Uses an Always Popular Subject.

an advertiser obtains a response from every person who may read his advertisement. Such results are not looked for. Many advertisers consider they would be well off if 10% of the people seeing their "ads" read them, and but 10% of these replied. In other words, if one per cent of replies were received they would feel that their advertisements paid them well. But even here it largely depends on what is being advertised. Thousands of products are advertised every day that are not intended for general consumption, and very few people could use the products advertised even if they were attracted to and read the advertisements. What bothers most advertisers is the apparent lack of attention people give to their advertisements. And, herein is where a great deal of waste comes in. Our ads, in the main, are not what they should be, if, in the long run, they fail to attract and interest many people who would otherwise be likely purchasers of our goods.

Primary Causes of Waste

Now, in order to save time, I will endeavor to point out some of the primary causes of waste in advertising with the hope that much will be revealed that will cause us to take our profession more seriously, and end in our being able to better serve the utilities whose interest we seek to advance.

One of the chief contributory causes appears to be the lack of understanding many advertising men possess in regard to the fundamental principles of advertising. It is astonishing how many advertisers there are who know but little about the basic factors that go into the making of result-bringing advertisements. Some of these principles embody an understanding of human nature, of human appeal, of how to persuade humanity, or groups of humanity, to feel as we do about the thing we have for sale, and with all this to apply it in such a way that purchasers of our goods are benefitted through the transaction. If mutual benefit does not follow the sale of an article, no matter what it might be, it is not salesmanship or advertising in the true sense of the word.

Now failure to apply these principles in an attention-attracting, interesting, confidence-inspiring and effective manner, accounts for much of the lack of full returns from advertising campaigns.

Lack of helpful and needful cooperation between the advertising and sales departments—failure to take advantage of opportunities to tie in with the production and distribution ends of the business—these also account for much in the way of reduced efficiency in the advertising effort.

Reduced effectiveness also follows the failure to appreciate the fact that advertising costs money when not prepared and presented in the right way, in the right media, at the right time, and in a manner consistent with a desire to build honest business that really and truly serves to the best interests of producer and consumer.

Many fail to appreciate the fact that successful advertising appeal is not made up of hurriedly prepared and carelessly written copy—that it is not necessarily exceedingly fine, correct English and so called "flowery language," nor clownish presentation of sales facts, nor prize contests that build trade. Rather, it is the use of everyday common sense, practically applied and in a manner such as is expected of any intelligent salesman when making his appeal to business men and women.

Other causes of waste can be traced to advertising articles of merchandise, goods, or services from which very little in the way of returns can be expected.

Convenient, Cheery Heat FOR FALL at Low Cost
A Fortunate Purchase from a nationally famous manufacturer goes on sale tomorrow at a price that sets an alltime low. » » » Better hurry for this exceptional value! This fortunate buy was made when prices were much lower and when the supply is gone the sale is over. Even our usual volume of business at regular prices would quickly exhaust this quantity.
MAGNIFICENT ENOUGH FOR A MANSION, PRICED FOR A COTTAGE
$7.85
85¢
DEALERS AND PLUMBERS
YOU NEED IT IN YOUR HOME:
HOW MUCH DOES IT COST TO USE?
HOW TO BUY
FOR YOUR CONVENIENCE
THE GAS AND ELECTRIC SHOP

A Prize Winning Newspaper Ad from Cincinnati.

Excessive use of advertising in an attempt to outdo a competitor is also a frequent contribution to waste. Also, the use of advertising to build up trade for products that are of doubtful value—for frauds—for unlawful and highly speculative enterprises and schemes.

Much in the way of waste follows the use of advertising in media, or publications the readers of which have no possible use for the thing advertised. Too much overlapping, where the readers of one publication are also readers of others containing the same advertisements, accounts for much waste.

Oftentimes too little thought is given to the most likely markets and how best to reach these markets. Many fail to make their appeals in the language of the common people who make up the great bulk of our

population; and others fail to appreciate the fact that we must meet our most likely patrons on their own ground, in their own way, and according to their point of view. As an example—the most successful exporters to foreign countries are those who become most like those with whom they wish to do business.

Waste most frequently follows the utilization of injudicious and inefficient methods of advertising. Men often forget the fact that highly effective appeals are only built on a foundation of knowledge of the business; knowledge of the goods; knowledge of the field in which possible outlets for the product exist; knowledge of how the field should be cultivated, what kind of seed should be sown, how the springing blade is to be nurtured and encouraged, and knowledge of how the great harvest is to be gathered in and safely stored—fruits of the wise and judicious application of fundamental principles governing successful sales appeal, and all ending in the development of public confidence and goodwill so necessary in the world of business today.

Advertising based on a knowledge of fundamental facts rightly applied seldom fails to bring results. Our only hope is that more of this class of publicity will find its way into the public press, into the business life of the people, into our homes, into the great outdoors, and everywhere, to the intent that some portion, at least, of the tremendous waste that has been, and is going on throughout the country today might be redeemed to aid in other ways, possibly in the further development of this great country in which our lot is cast.

Advertising pays, and pays well under certain happy combinations of circumstances. Take almost any useful quality product for which there exists a real need; back it up with a well-thought-out advertising campaign, using copy that is truthful, confidence-inspiring, attractive and appealing; place it in the right media, at the right time, plus the active co-operation of a well-trained sales organization, and an efficient production and distribution system, and it will be found that advertising pays and pays well.

However, such a happy combination of effective interests is unfortunately not always the case. Many campaigns have fallen down because they lacked some one or more of the particulars mentioned. No amount of good copy, fine and attractive appeal, and much otherwise effectual material, so necessary in the making of a successful bid for public favor and goodwill, will ever succeed if there is not an efficient sales, production and distribution organization back of it.

Judicious advertising, good salesmanship, high-class quality production and efficient distribution go hand in hand in the building up of any business. These are the foundations on which lasting success depends. Unless co-ordinated in an efficient manner and scientifically applied there cannot be the expected results. They are interdependent one upon another, so to speak.

Are We Doing a Good Job?

In closing, let us ask ourselves, as advertising men in the great public utility field, are we applying ourselves to the best of our abilities to sense out or analyze what are the most likely and profitable ways and means of getting our story across to the masses and are our methods of attracting favorable attention to our appliances the best means for doing so, or do we just think so? I feel that many of us would come far short if our salaries depended on the success of our advertising plans, and had to be refunded should we fail to make good.

We advertising men repeatedly tell others of the benefits that come to firms who adopt the satisfaction or money back policy, and repeatedly declare that advertising pays and pays well, yet are in ourselves afraid to stand on the same platform and return our fees, or salaries, should our campaigns of advertising fail to make good.

BANISH THE SHADOW OF WINTER FROM YOUR HOME
GAS HEATING MUST BE WONDERFULLY CONVENIENT BUT—
MY DEAR, YOU'LL BE ASTONISHED HOW CHEAP IT IS!
HUNDREDS of gas-heated homes in Vancouver can testify to the cheapness, plus the convenience, healthful qualities and freedom from labor of this most modern type of heating.
Gas for heating is charged at a special low rate, recently reduced. You use only the heat you want, when you want it. You can turn off the heat when you go out and turn it on the moment you come back. At night, you can reduce the temperature to 55 and raise it when you get up.
Let us show you what other people are paying for the convenience of gas heating and let us make an estimate, free of any obligation to you, of what it would cost you.
HEAT WITH Gas
100% B.C. FUEL
This West First Avenue home of seven rooms was heated with gas last season (October to April inclusive) for $72.07, which included the cost of gas water heating.
B. C. Electric Railway Co. Ltd.
Gas Dept., Vancouver, B. C.
Please send me without obligation your free booklet "Heat Your Home with Gas at No Extra Cost."
Name
Address
Let us show you how you can install a gas air-conditioning system on very easy terms. Send for our new booklet now.
B.C. ELECTRIC RAILWAY COMPANY

British Columbia Gets in a Telling Point.

Notes on High Pressure Gas Distribution

(Continued from page 19)

18 cubic feet in the design of territory C with the result that the mains are far in excess of their needed capacity. This illustration indicates how organization affects engineering design.

Numerous examples such as the above might be used to illustrate variable factors in gas distribution design which indicate why simplicity has been advocated in making assumptions. These illustrations also indicate the broad vision necessary on the part of an engineer who must assume mathematical figures in the design of a system and the care necessary to avoid spending excessive amounts for capital investment through an over-indulged enthusiasm of load prospects.

(Continued in Feb. Issue)

Diaphragms

(Continued from page 33)

change from suppleness while wet to stiffness when dry, and then return to an intermediate position, but would work from the suppleness to the intermediate position directly. This same effect would be expected when the diaphragm oil is driven from a meter, and while stiffness under these conditions is much less than if it is allowed to dry unflexed — hardly any difference being noticeable, in fact—it is, as we know, sufficient to throw the meter off proof.

"There is still much work to be done in finding out just how a diaphragm acts under varying conditions of service. We are investigating it as fast as we can, but there are so many branches to work that it will be a long time before we shall have any tangible results. You may be interested in knowing that in England and Germany they are just now investigating the same subject, though all the information we have indicates that they are aware of it without having investigated fully and found a way of correcting it. We shall certainly make it known when we have the information we are after, and if the writer continues to be a member of the Meter Committee of the A. G. A., it will be announced through the reports of that Committee. Otherwise, it will be spread by our representatives to those who are interested."

Public Hearing on Natural Gas Code

PUBLIC hearing on the proposed natural gas code was held in Washington, D. C., Jan. 3rd. Leighton Peebles, Deputy Administrator in charge of utility codes, presided. K. M. Simpson, Division Administrator of the N. R. A., was present. Presentation of the code and a detailed analysis of its provisions were made by H. L. Dickerson, of New York, Chairman of the Natural Gas Code Committee, and D. C. McCreery, attorney.

Deputy Administrator Peebles queried Messrs. Dickerson and McCreery in reference to definitions of certain terms and phraseology in the code, after which the meeting was thrown open to code opponents. These consisted of three representatives of the oil industry, five representatives of the coal industry, one representative of land owners in Louisiana, Labor Adviser King, and Mercer G. Johnston of the Consumers Advisory Board.

In Behalf of the Oil Industry

Those appearing in behalf of the oil industry were E. H. Eddleman, Secretary of the Producers Sub-Committee of the Planning and Coordinating Committee, which is the code authority of the petroleum industry; Harry F. Tapp, Executive Secretary, and Morgan J. Hammers, Chairman, of the Oil Burner Code Authority, New York. These three objected to the wage and hour provisions of the natural gas code and asked that the natural gas industry submit to the same wage and hour provisions as are contained in the petroleum code.

Representatives of the coal industry who opposed the code were Roderick Stevens, New York, Chairman of the Code Committee of the National Retail Coal Merchants Association; H. E. Westerman, of Montgomery, Minn., appearing in behalf of the Northwest Retail Coal Dealers Association; J. D. Battle, Traffic Manager of the National Coal Association; J. B. Scott of the Anthracite Institute, and W. Y. Wildman of the Illinois Coal Traffic Bureau. Opposition voiced by these five representatives of the coal industry all centered around the charge that natural gas was being sold at prices lower than the cost of production and transmission, and was displacing large quantities of coal.

G. B. Bullis of Vidalia, Louisiana, appearing in behalf of a group of land owners in his state, claimed that the natural gas industry was subject to no practical regulation and asked that steps be taken to bring the production end of the business under such control as to safeguard the interests of persons who have leased their lands for drilling purposes.

Labor Adviser King said he was in agreement with all suggestions made by the opponents and was opposed to the wage and hour provisions of the code. He recommended that the natural gas code in all of its major respects conform to the petroleum code.

Mercer G. Johnston of the Consumers Advisory Board offered several amendments, one of which would make it possible for municipal plants to come under the code or stay out of it, as they desire. He also suggested that performance standards for the industry should be set up by the United States Bureau of Standards.

Natural Gas Complimented

A. J. Hettinger, Jr., of the Division of Research and Planning of the N. R. A., gave a statistical analysis of the natural gas industry, emphasizing the industry's record of employment since 1929. He declared that 90% of the operating force of the industry had been employed during the depression, as against an average of 50% of employment for the country, at large, and complimented the industry on this record. He stated that capital investment in the natural gas business was now larger than in 1929. Present wages are fair, he said, and the greatest contribution that the industry can make at this time is to re-employ more men on construction work.

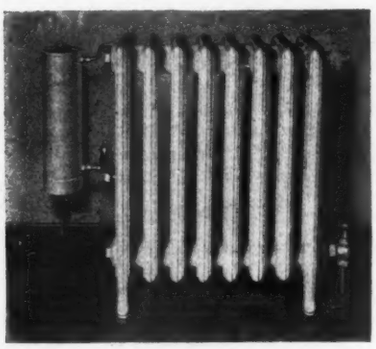
Opponents of the code were requested to file briefs within one week. Following a study of these by the Deputy Administrator and his staff, and the Natural Gas Code Committee, a second public hearing will be called by Deputy Administrator Peebles.

EQUIPMENT NEWS

New Humidifier

To meet the demand for a popular priced humidifier that will actually provide humidity for homes and buildings to protect health and furnishings, the American Radiator Co., New York, N. Y., has placed on the market the ARCO Humidifier "A", a humidifying attachment for existing radiators on either steam or hot water systems.

This attachment is fastened to the end of the radiator so that the heating medium (either steam or hot water) flows through a coil emersed in water, bringing the water near the boiling point and causing constant vaporization. Included in the unit is an electrical heating element that can be used



as an auxiliary source of heat for vaporization, on hot water systems or on steam systems when the boiler is operating with very little pressure.

A cylinder surrounding the coil is filled with water, manually, and there is an automatic switch to turn off the electrical element should it be working when all the water evaporates. The unit, which is made of brass with a nickel finish, can be attached by simply removing two small screw plugs from the end of the radiator and screwing the compression fittings on the humidifier into two holes that already exist. On old style radiators that do not happen to have the holes to be found on recent models, the humidifier can be attached by tapping two holes in the end of the radiator.

Burnham-Simplex Gas Boiler

The Burnham Boiler Corporation of Irvington, New York, has added to its heating line a new series of Gas-Fired Boilers, made in accordance with A.G.A. specifications and has been tested and approved by the Testing Laboratory at Cleveland.

These Gas Boilers are equipped with dependable controls which supervise the operation of the heating plant with accuracy. A thermostatic pilot prevents the flow of gas to the burners unless the pilot is lighted. Steam pressure or water temperatures are always maintained within pre-determined limits.

All controls are concealed within the boiler Jacket which may be assembled after all piping has been installed. A Built-In type of Draft Diverter is another feature.

Stand-by heat losses are minimized with a thermostatically controlled air supply door.

This Boiler is made in a complete range of sizes up to 6,000 square feet of radiation.

Mr. Louis Stotz has been appointed as the direct factory representative, whose headquarters are 23 Halsted St., East Orange, N. J.

Three-Burner Gas Bench Furnace

Red Devil Mfg. Co., Bellwood, Ill., announce a new No. 30 industrial gas fired bench furnace. It has three powerful Bunson burners, each with a shut-off valve. Firebox is lined throughout with fire clay. On opening burner gas is lighted by pilot-light and there is a flame temperature of 2250°F. It is large enough to handle the largest soldering irons, hotchet irons, branding irons, and for the heat treating of many carbon steel tools and metal parts. It can also be used for melting small quantities of lead, tin, zinc and other soft metals.

Chapin-Fulton Develop Gas Air Duplex Regulator

The new Duplex gas-air proportioning regulator just announced by the Chapin-Fulton Manufacturing Co., Pittsburgh, Pa., is designed to do away with the necessity, hitherto obtaining with most types of industrial gas combustion equipment, of installing first a reducing regulator, then a proportioning regulator. The new device is claimed to maintain not only a constant pressure ratio between the gas and air supply, but also reduces the initial gas pressure to that required for the burners. It thus performs two operations with a single setting, with, it is claimed, a considerable saving in the initial outlay.

The regulator is installed in the gas line supplying the burners, the outlet pressure being connected to the lower diaphragm, and the air pressure to the upper. The volume being in direct proportion to the pressure, the regulator functions through a definite pressure ratio. It is so constructed that, by the application of the gas and air pressures to two separate diaphragms of unequal area, a definite, predetermined pressure ratio may be maintained between gas and air at all times.

Roots-Connersville-Wilbraham Issues New Bulletin

Roots-Connersville-Wilbraham, Connersville, Ind., has just issued a new bulletin, 260-B11, descriptive of its Type "T" Turbine Pumps, which are designed to handle comparatively small quantities of liquids at high pressures.

Page one is devoted to a general discussion of the applications, operating characteristics, design features, etc.

Illustrations and text, giving structural details as well as a list of applications for which the manufacturers claim that these pumps are especially suited, appear on pages two and three.

On page four appears a table showing capacities from 5 to 100 gals. per minute, at heads up to 300 ft. It is claimed by the manufacturers that larger capacities and higher heads can be provided. Page four also carries a characteristic performance curve, illustrating the pump efficiency.

Standard pumps have cast iron casings with bronze alloy impellers and ground steel shafts. It is stated that pumps of corrosion resistant metals can be provided. Compact size, simple design, light weight, and high efficiency are claimed.

General Regulator Corp. Elects New Officers

The General Regulator Corporation, 50 Church St., New York, manufacturers of Regulators and Combustion Control Systems, announce the election of the following officers: C. J. King, President; R. A. Wright, Vice-President; F. H. Plum, Vice-President and Secretary. The above officers were formerly President, Sales Manager, and Vice-President respectively of the Smoot Engineering Corporation. J. W. Ackley is Treasurer. Under this management which has had sixteen years' experience in the design, manufacture and operation of Regulators and Combustion Control Systems, the General Regulator Corporation is now ready to place on the market a line of regulating equipment featuring a new stabilizing principle.

Universal Power Corporation Appoints Two New Representatives

The Universal Power Corporation, Cleveland, O., recently made the following appointments: Mr. F. R. Faulk, 50 Penn Avenue, Pittsburgh, has been appointed District Sales Representative for Universal Arc Welders, accessories and welding electrodes.

The Welding Equipment and Supply Company, 2720 East Grand Boulevard, Detroit, has been appointed Detroit Distributor for Universal Arc Welders, accessories, and electrodes. Mr. Thomas Butler, of Welding Equipment & Supply Company is widely known in Detroit welding and automotive circles.

NEWS of the GAS INDUSTRY

Indiana Public Utility Companies to Discontinue Collection of Penalty Charges

Indiana public utility companies have been notified by the public service commission that the collection of penalty charges from consumers whose monthly bills have run delinquent must be discontinued by Feb. 1. An order has been written fixing the last date. Members of the commission say that in some cases the penalty charges were as high as 21 per cent of the actual service charge. The latest order provides:

That collection charges shall be more nearly uniform for all utilities.

That collection charges shall more nearly conform to actual collection costs since they are no part of the cost of services given consumers in general.

That gross and net, or duel rate schedules are not authorized by law.

That companies now granting discounts for prompt payment shall continue to do so.

That changes to conform to the order shall not cause increased costs to any consumer.

That all utilities must file supplemental rate schedules conforming to the order by Feb. 1, 1934.

McCarter Medal Awarded to Gas Company Collector

Through application of the prone pressure method of resuscitation, Leonard E. Rench, a collector of the Northern States Power Company, St. Paul, Minn., saved the life of a man who had been overcome by gas. In recognition of his act, Mr. Rench was presented with a Thomas N. McCarter Medal. The medal was bestowed in behalf of the American Gas Association by G. O. House, general manager of the St. Paul Division of the company, in the presence of a group of department heads.

Texas Again Leads Nation in Gas Production and Use

Texas ranked first in both production and consumption of natural gas in 1932, according to statistics just released by the United States Department of Commerce. California was second and Oklahoma third. Ohio topped all states in consumption of gas for domestic and commercial use, Texas holding its lead as chief consumer by virtue of the heavy use of gas for carbon black manufacture and petroleum refining in this state. Oklahoma used more gas in oil and gas fields than any other state.

The downward trend in the production of natural gas which was first evidenced in 1931 continued during 1932 when the marketed production amounted to 1,555,990,000,000 cubic feet, a decrease of 8 per cent from 1931. This decline was caused entirely by a general falling off in industrial demand, as consumption for commercial and domestic purposes continued to increase.

The total consumption of natural gas, production plus imports minus exports, amounted to 1,554,335,000,000 cubic feet, a decline of 8 per cent from 1931. Of the total, 34 per cent was used for field purposes, 25 for domestic and commercial purposes, 11 in the manufacture of carbon black, 7 in electric public utility power plants, and 4 at petroleum refineries, the remaining 19 per cent being used for other industrial purposes.

New Well Drilled in at Pendleton, Ind.

The natural gas supply at Pendleton, Ind., will be increased considerably by a well recently drilled in three miles east of the city. The capacity is more than average for that section. Another well will be drilled soon.

Results of Ice Cube Contest Announced

The results of the first Prize Contest conducted by the Refrigeration Committee of the American Gas Association were recently announced. This contest began July 1st and ended October 30th. During this time more than 300 local gas company sales offices—with three and a half million retail meters—contested vigorously to "sell the most ice cubes." The winners of the first three prizes are as follows:

First Prize, $750 won by The Municipal Gas Company, Ennis, Texas. This company sold 3348 ice cubes. They have an average of 372 ice cubes per 100 meters. Local Manager—J. H. Duke.

Second Prize, $500 won by The Municipal Gas Company, Hillsboro, Texas. They sold 2448 ice cubes and have an average of 233.1 ice cubes per 100 meters. Local Manager—E. L. Buelow.

Third Prize, $250 won by The Sumter Gas & Power Co., Sumter, S. C., which company sold 1322 ice cubes and have an average of 160.2 ice cubes per 100 meters.—J. S. Rider.

It is worthy of note that the 1st and 2nd prizes were won by local offices of the same gas company. To John L. White, Jr., General New Business Manager of the Municipal Gas Company, must go important credit for this very fine performance. However, to take care of this unforeseen situation, the Committee has decided to award a fourth prize of $200. The winner is the Concord Office of the Boston Consolidated Gas Company with an average 134.9 ice cubes per hundred meters. The local manager, J. A. Young, registered 1156 retail meters, and reported 1560 ice cubes sold.

Convention Calendar

January 1934

26-28 American Society of Heating & Ventilating Engineers, Detroit, Mich.

February

5- 8 American Society Heating & Ventilating Engineers, New York, N. Y.
8- 9 Eastern Natural Gas Regional Sales Conference, William Penn Hotel, Pittsburgh, Pa.
8- 9 New England Gas Association Convention, Boston, Mass.
15-16 Mid-West Regional Gas Sales Conference, Chicago, Ill.

March

6- 7 Oklahoma Utilities Association, Tulsa, Okla.
21-23 Joint Conference Southern-Southwest Regional Gas Sales Council—Commercial Section, A.G.A., Peabody Hotel, Memphis, Tenn.
23 New Jersey Gas Association, Trenton, N. J.
25-30 American Chemical Society, St. Petersburg, Fla.

April

16-17-18 Mid-West Gas Association, Sioux City, Iowa.

May

1- 4 U. S. Chamber of Commerce, Washington, D. C.
14-18 National Fire Protection Association, Atlantic City, N. J.
24 National Board of Fire Underwriters, New York, N. Y.

June

4- 5 Canadian Gas Association, Montreal, Canada.
18-21 National Association of Purchasing Agents, Cleveland, Ohio.
25-29 American Institute Electrical Engineers, Hot Springs, Va.

September

9 American Trade Association Executives, Wernersville, Pa.

October

Wk. 29 American Gas Association Convention and Exhibition, Atlantic City, N. J.

Awards Made by Consolidated Gas Company for No Lost Time Accidents

Officers and department heads of the Consolidated Gas Company of New York and its affiliated gas companies were present December 20, at a special ceremony held at the Ravenswood gas manufacturing plant, Long Island City, when employees of the plant received a silver safety award for completing five years' operation without a lost-time accident.

John Stilwell, vice-president, and W. Cullen Morris, vice-president and chief engineer, presented an engraved silver bar to the workers. The bar was added to the bronze safety plaque which the company gives to all plants and departments for operating one year without lost-time accidents.

The Ravenswood Plant has operated a total of 1,725,084 man-hours without an accident involving loss of time from work. This record is considered one of the best in the company, being second only to that of the Elizabeth Street branch of the Customers' Service Department, which to date has operated for five and one-half consecutive years without an accident.

P. U. A. A. Announces Annual "Better Copy" Contest

The annual "Better Copy" contest of the Public Utilities Advertising Association will be conducted again this year.

Louis D. Gibbs, assistant head of Public Relations of the Edison Electric Illuminating Company of Boston has been selected as chairman of the Better Copy Committee.

Mr. Gibbs is a past president of the P.U.A.A., and as superintendent of Advertising of the Edison Company of Boston since 1910, has won numerous awards in these contests during the last seven years.

All entries must be addressed to Mr. Gibbs, 182 Tremont St., Boston, Massachusetts. The closing date will be announced later.

The awards will be announced as usual at the annual convention of the Association.

The rules and conditions of the contest follow:

1. The contest is open to all public utility operating companies which are represented by membership in the Public Utilities Advertising Association.

2. The contest embraces advertising published between January 1, 1933, and December 31, 1933, and includes newspaper and outdoor advertisements and window display.

3. The subject matter eligible includes advertisements dealing with all features of utility operation. No Syndicate advertisements will be considered in this contest.

4. Companies may submit selection of not more than ten advertisements, and ten displays, in each division listed below. In the division for campaigns, not more than two campaigns of not more than ten advertisements each may be entered.

5. Entrant must designate the division in which various advertisements and displays are to be entered. Awards will be made for the best single advertisements, outdoor displays, and window display in each class except the last in which awards will be made for a series of newspaper advertisements constituting a campaign.

6. Classes of advertising eligible for awards in the contest are as follows:

Gas Newspaper Advertising, to include all kinds of gas advertising — two awards.

Electric Newspaper Advertising, to include all kinds of electric advertising —two awards.

Transportation Newspaper Advertising, to include all kinds of transportation advertising—two awards.

Outdoor Advertising, to include posters, billboards and signs of all kinds —two awards.

Electric Window Displays—two awards.

Gas Window Displays—two awards.

General Utility Advertising, to include all other newspaper or magazine advertising not mentioned above—two awards (manufacturers may enter here).

Campaign Advertising, to include best series of newspaper advertisements (institutional, appliance or sales promotion) open to electric, gas, and transportation companies.

7. Newspaper advertisements submitted should be printed on enamel stock. Outdoor advertising and Window Displays submitted should be photographed prints, size 8 by 10 inches.

Important Industrial Gas Meeting

A joint meeting of the Metropolitan Industrial Gas Sales Council of New York City, and the Philadelphia Industrial Gas Sales Council, will be held on January 17, 1934 in Trenton. N. J. The meeting, preceded by a luncheon will be held in the Cataract Club at 1:30 P. M.

In the morning inspections will be made of two plants where important gas installations have recently been made. The first inspection will be at the plant of Lenox, Inc., one of America's foremost producers of china ware. At this plant there has been developed, and recently put in operation, through the efforts of the Industrial Research Committee of the American Gas Association, the first successful direct gas fired kiln for glost firing of china ware. This furnace embodies the solution of many mechanical and combustion problems worked out in cooperation with Lenox, Inc., and Rutgers University.

The second inspection will be made at the plant of the Morrison Art Tile Company of Morrisville, Pa., one of the largest producers of tile in this country. At this plant three Tunnel Kilns, 120' long have recently been converted from electricity to gas fuel.

Plan to Lift Alabama Natural Gas Corporation from Receivership

Plans for lifting the Alabama Natural Gas Corporation, of Birmingham, from receivership was submitted to the Alabama Public Service Commission recently. The proposed reorganization according to Forney Johnston, Birmingham, attorney, contemplates the purchase of the common stock of the insolvent company by the Southern Natural Gas Corporation, owning pipe lines which extend from the Louisiana fields through several southeastern states.

Ordinance at Evansville, Ind., Greatly Increases Gas Company's Tax Rate

A recent ordinance at Evansville, Ind., has included property inside the city's boundaries which will greatly increase the city tax rate of the Southern Indiana Gas and Electric Company. Heretofore much of the production property of the company was outside the city. Officials of the company have not decided as to what court action to pursue.

Standard Gas and Electric's Construction Budget

Standard Gas and Electric Company's preliminary construction budget for 1934 will total $11,792,233 for public utility companies in the system, according to John J. O'Brien, president of the company. The foregoing amount includes estimated expenditures of $1,418,464 to complete construction work now in progress at utility properties in the Standard Gas and Electric Company system.

The total preliminary budget expenditure for 1934 may be segregated as follows: electric department, $7,783,811. gas department, $1.757,564; other departments, $2,250,858.

North Carolina Restricts Utility Dividend Payment

Stanley Winborne, North Carolina Utilities Commissioner, recently issued an order placing rigid restrictions upon the payment of dividends by utilities, the issuance of additional capital stock, and the rates of depreciation.

The order, which becomes effective immediately, was issued "to protect the financial integrity of the utilities and the public interest," Mr. Winborne said. The following restrictions were imposed:

1. No utility shall use any part of its surplus in the payment of dividends on its common stock except upon showing the necessity therefore and upon authority of the commission.

2. No utility with indebtedness, in addition to that for current expenses, shall declare dividends in any amount in ex-

cess of its net income after depreciation and in no case shall the dividends exceed 6 per cent a year.

3. Where any utility without indebtedness declares a dividend in excess of 7 per cent it will be deemed prima facie evidence that rates are unreasonably high and the utility will be called upon to show cause why its rates should not be immediately reduced.

4. No utility may increase its capital stock, in any manner, for any consideration except after application to and specific authority from the commission to do so.

5. Rates of depreciation are limited to 4 per cent for telephone utilities; 3 per cent for electric utilities, and 2 per cent for artificial gas utilities, and these percentages may not be unreasonably decreased to increase the net revenue.

Birmingham Gas Company Adopts New Policy

The Birmingham Gas Company has adopted the policy of allowing credits once a year on bills representing interest on customers' service deposits. The amount of interest for 1933 was $25,000 and was credited on December bills.

Advisers on Natural Gas Industry Code Appointed

The Consumers' Advisory Board recently announced the appointment of M. G. Johnston as consumer adviser for hearings on the Natural Gas Industry code.

Herman Brunck and M. B. King were also recently appointed labor advisers by The Labor Advisory Board for hearings on the Natural Gas Industry Code.

Gas Industry Profits From Added Customers

Ninteen hundred and thirty-four, from present indications, will be a better year for the gas industry than any of the past four or five years. Gas heat, generally acknowledged to be the most efficient heat for industrial purposes, having about 20,000 different uses, was quick to feel the let-down when factories closed and many big plants curtailed their production.

The upward turn has come with almost equal swiftness, comments the New Jersey Public Utility Information Committee. The motor industry, one of the big users of gas heat, has made large gains and there have been corresponding increases in other lines. The return of the brewing and distilling businesses have been unexpected additions to the list of industrial heat customers. There is some reason, therefore, to anticipate a continuous forward movement by the gas industry.

Eastern Sales Conference Opens in Pittsburgh Feb. 8

At a meeting of the Eastern Natural Gas Regional Sales Council, under the auspices of the Commercial Section of the American Gas Association, in Pittsburgh, December 11, it was decided to hold the Eastern Natural Gas Regional Sales Conference February 8 and 9 at the William Penn Hotel, Pittsburgh. This conferences embraces natural gas activities in New York, Ohio, Pennsylvania, West Virginia and Kentucky.

An interesting program is being prepared by the committee in charge. The following are among the subjects to be discussed:

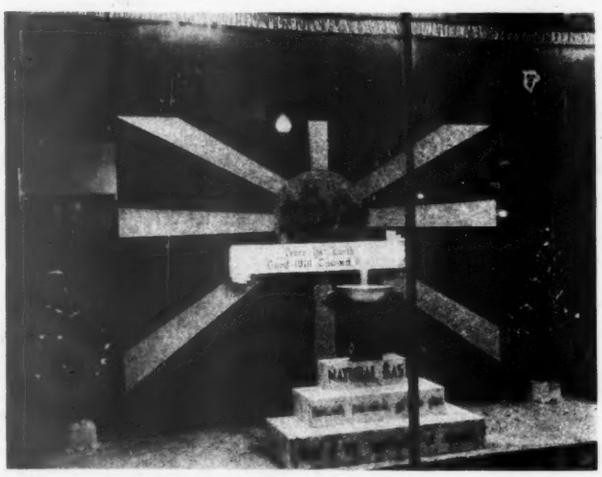
"With Radiant Heaters," "With Circulating Heaters," "With Unit Heaters," "Refrigeration from the Natural Gas Viewpoint," "Rental — Lease — Sales —Plans," "Large Volume Water Heating," "Holding and Developing the Industrial Gas Load," "Customer Reaction from the Home Service Viewpoint," "Necessity of Sales Development from the Executive's Viewpoint," "Executive Advertising under Today's Conditions," "Hotel and Restaurant Sales Development Activities" and "Winter Air Conditioning."

Among the speakers who have been invited to take part in this program are the following:

William F. Eve, Jr., Atlanta Gas Light Co., Atlanta, Ga.; O. J. Haagen, Columbus, Ohio; L. F. Ryall, General Gas Light Co., Kalamazoo, Mich.; B. H. Gardner, Columbia Engineering & Management Corp., Columbus, Ohio; Davis M. DeBard, Stone & Webster Service Corp., New York, N. Y.; H. B. Yost, Hope Natural Gas Co., Clarksburg, W. Va.; Karl Emmerling, East Ohio Gas Co., Cleveland, Ohio; French Robinson, Peoples Natural Gas Co., Pittsburgh, Pa.; R. H. Staniford, The Brooklyn Union Gas Co., Brooklyn, N. Y.. and Lyle C. Harvey, Bryant Heater Co., Cleveland, Ohio.

Members of the Eastern Natural Gas Regional Sales Council are as follows:

E. E. McCormick, Chairman, Peoples Natural Gas Co., Pittsburgh, Pa.; Karl Emmerling, East Ohio Gas Co., Cleveland, Ohio; B. H. Gardner, Columbia Engineering & Management Corp., Columbus, Ohio; G. M. Harr, Monongahela West Penn Public Service Co., Fairmont, W. Va.; F. B. Jones, Equitable Gas Co., Pittsburgh, Pa.; T. C. Jones, Delaware Gas Co., Delaware, Ohio; Robert Montgomery, Louisville Gas & Elec. Co., Louisville, Ky.; P. L. Mulkin, United Natural Gas Co., Oil City, Pa.; R. E. Polk, Equitable Gas Co., Pittsburgh, Pa.; Wm. F. Reid, Manufacturers Light & Heat Co., Pittsburgh, Pa.; S. B. Severson, Republic Light, Heat & Power Co., Buffalo, N. Y.. and H. B. Yost, Hope Natural Gas Co., Clarksburg, W. Va.



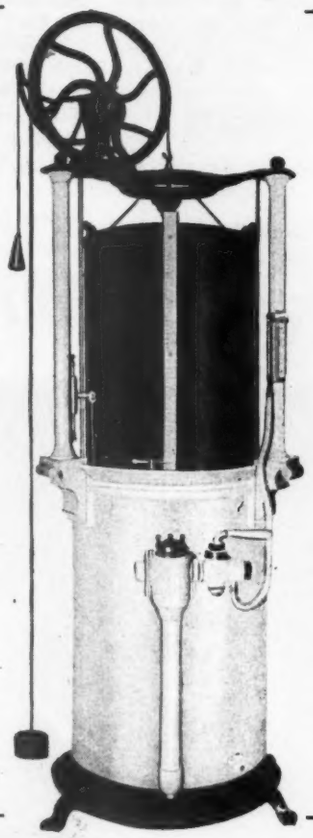
Novel Window Display

The window trim of the Sapulpa Gas Company, which was used during December created a great deal of local interest and was designed around the central thought of a living natural gas flame. This product of nature and its usefulness to mankind is symbolically depicted in the altar and urn supported by the hands. By means of a special burner there was produced a large natural gas flame typical of the torch, which gave an especially good effect at night.

The Sapulpa Gas Company serves the city of Sapulpa, a town of some fifteen thousand population within twenty miles of Tulsa, Oklahoma; and utilizes natural gas obtained in Creek County and transported to its city gate station through its own transmission system. The Company has been re-organized after a purchase out of receivership in November, 1932 and is rapidly developing, largely as a result of its educational program and Customer Interest Campaign.

SUPERIOR

Gas Meters
Provers
Service Cleaners
Diaphragms
Repairs



SUPERIOR METER CO.
167-41st Street
Brooklyn, N. Y.

HEATING BUNKER "C" OIL

for carburetting gas requires high pressure and high temperature.

ANDALE BOWED TUBE HEATERS

remain tight and are easily cleaned. These are the requirements for continuous satisfactory operation.

ANDALE COMPANY
1600 ARCH STREET
PHILADELPHIA

Byllesby Engineering and Management Corporation

Wholly-owned subsidiary of
Standard Gas and Electric Company

231 South La Salle Street, Chicago
New York Pittsburgh San Francisco

Personals

William A. Sauer, vice-president in charge of accounts, Peoples Gas Light & Coke Company, Chicago, Ill., was recently presented by his fellow officers with a beautifully engrossed leather-bound book commemorating his forty years of service with the gas company.

The presentation took place at Mr. Sauer's home in Evanston, where he is convalescing after a long illness.

The book bears the signatures of James Simpson, chairman. George A. Ranney, vice-chairman; George F. Mitchell, president, and other officers of the company.

Charles O. Gossard, manager of the North Kansas City office of the Kansas City Gas Company, Kansas City, Mo., has been elected executive secretary of the North Kansas City Chamber of Commerce as a result of the fine work he did as secretary of the Industrial Fair held in that city during the past fall. The fair was a success and Mr. Gossard was mainly responsible in seeing that no money was lost on the venture.

Dr. Arthur D. Little, Cambridge, Mass., head of the chemical engineering firm that bears his name and a member of the American Gas Association, was honored by his staff upon his seventieth birthday, December 15. On behalf of his associates, Roger C. Griffin, director of tests and a member of the board, presented Dr. Little with a specially bound and inscribed volume of the Morse Collection of Japanese Potteries. Mr. Griffin is a son of Roger B. Griffin, Dr. Little's partner when the organization was formed as Griffin & Little, in 1886.

Howard Coonley was recently elected to the presidency of the American Standards Association for the year 1934. Mr. Coonley is the president of the Walworth Company, New York, and also a director of several industrial, insurance, and banking organizations.

F. E. Moskovica, chairman of the Board of the Marmon-Herrington Company of Indianapolis, and vice-president of the American Standards Association, was also re-elected for the coming year.

J. C. Irwin, representing the American Railway Association, and **F. M. Farmer,** representing the American Society for Testing Materials, were elected to the chairmanship and vice-chairmanship respectively, of the Standards Council of the American Standards Association, the body in charge of the development of technical standards.

Charles E. Gallagher, formerly vice-president and general manager, has been elected president of the East Ohio Gas Company, Cleveland, Ohio. He succeeds his brother, Ralph W. Gallagher, who resigned recently to become a director of the Standard Oil Company of New Jersey, in charge of its natural gas operations.

Robert E. Finley has been appointed manager of the gas division of the Dayton Power & Light Co., Dayton, O. Mr. Finley was a district manager, located at Washington Court House, Ohio, prior to his promotion.

Mr. Finley has been connected with the company since 1919 when he started in as a co-operative student from the University of Cincinnati of which he is a graduate in electrical engineering. He was first assigned to the construction department.

Born in Nelsonville, Ohio, Mr. Finley later attended Ohio State University but his studies were interrupted by the World War. He enlisted with a Dayton unit and assigned to headquarters company, 62nd Field Artillery Brigade, 37th Division. He served overseas in France.

Wesley F. Wright, formerly general manager of the Fort Worth Division of the Lone Star Gas Company, Texas, was recently elected vice-president and operating manager of the Dallas Gas Company, Dallas, Texas.

Mr. Wright was previously with the Dallas Gas Company, having come from Indiana in 1910 to join the company. He was superintendent of distribution when he left in 1929 to become general manager in Fort Worth. He succeeds R. G. Soper who was elected president and general manager of the Dallas concern following the death of the late Henry C. Morris. Mr. Wright will also be general manager of distribution in the Dallas-Fort Worth area.

Mr. Wright was succeeded in Fort Worth by **F. L. Carmichall,** formerly general superintendent of the Community Natural Gas Company, also a member of the Lone Star Gas System.

Mr. Carmichall, after leaving the Graver Corporation of Chicago, Ill., in 1925, went to Texas and joined the Dallas Gas Company, a year later entering the engineering department of the Community Natural Gas Company. Participating in the construction of many of the community's 250 town plants, he was appointed general superintendent January 1, 1928.

E. M. Tharp, vice-president, Columbus Group of gas companies in the Columbia System, has been appointed general manager of the group, which includes the Ohio Fuel Gas Company, Columbus Gas & Fuel Company, Federal Gas & Fuel Company and the Springfield Gas Company, covering 325 Ohio towns. The appointment was announced by C. I. Weaver, president of the group, who will still retain supervisory authority of these and other companies in the Columbia System. Mr. Tharp is recognized as an authority on gas sales promotion.

Leo H. Leary, prominent Boston lawyer and former assistant football coach at Harvard, was recently appointed as a member of the State Public Utilities Commission to succeed Everett B. Stone of Springfield, whose term expired December 1st.

Frank B. Fairweather has been appointed manager of the Natural Gas Corp., of California at Calexico, having been transferred to that post from a similar position at Arcata, Cal., where he has served with the company for two and a half years.

Robert I. Fletcher recently resigned as comptroller of Central Hudson Gas & Electric Co., Poughkeepsie, N. Y. Mr. Fletcher will take up a similar office with the Long Island Lighting Co., L. I., N. Y.

In announcing Mr. Fletcher's resignation to the press Ernest R. Acker, president, said, "During the time he was with our organization Mr. Fletcher completely reorganized our accounting system and installed a thoroughly modern system of machine accounting which has lately been used as a model by other large firms throughout the country. The work that he has done here has been very outstanding and we regret to lose Mr. Fletcher, but he has so much greater an opportunity that consideration must be made of his personal advancement."

Mr. Fletcher came to Central Hudson January 1929 from the auditing firm of Price, Waterhouse and Company, New York City.

All sizes up to 3,400 cu. ft. capacity

Meters
Diaphragms
Repairs
Provers
Pumps
Calorimeters
Wet Meters
Gauges
Apparatus

METER REPAIR PARTS

FOR

ALL MAKES - ALL SIZES OF METERS

LARGEST GAS COMPANIES NOW USING OUR PARTS

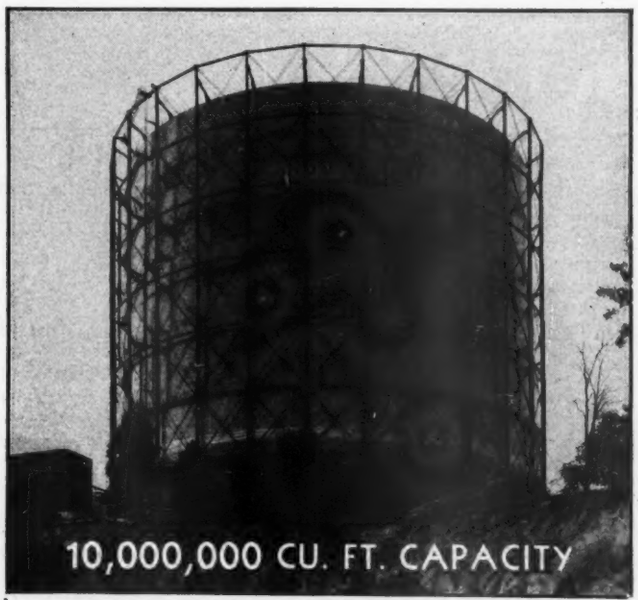
SEND FOR OUR CIRCULAR ON METER REPAIR PARTS

SAMPLES AND PRICES GLADLY SENT

— o —

LAMBERT METER CO.

BUSH TERM. BLDG. 4, BROOKLYN, N. Y.



HIGH PRESSURE GAS HOLDERS LOW PRESSURE

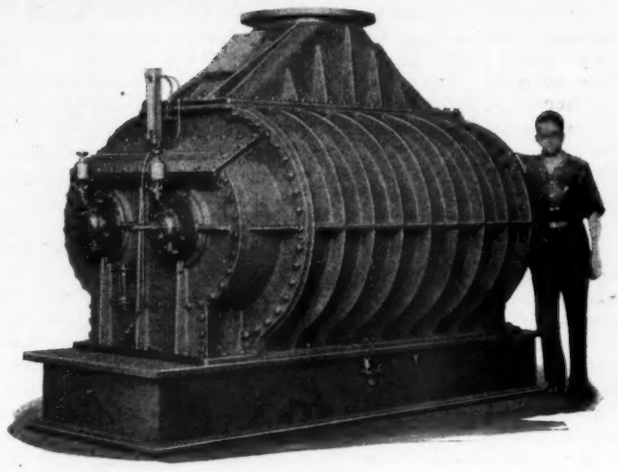
PURIFIERS · TANKS · CONDENSERS
STEEL PLATE CONSTRUCTION

INTEGRITY GOOD WORKMANSHIP FAIR DEALING

CRUSE-KEMPER CO.

AMBLER, PA.

1,500,000 C.F.H.



THIS 26 x 72 Connersville Meter, passing more than 1,500,000 cu. ft. of 30-60 gas per hour, at pressure of 20 lbs., installed in a leading Chicago packing house, is the largest single positive displacement meter ever supplied for industrial service.

Connersville Meters are acceptable to both gas producers and consumers because their dependable accuracy is machined in, and is maintained by cast iron and steel construction throughout. They are fully tested before shipment from the factory, thus guaranteeing satisfactory field operation.

A wide range of sizes and types is available. Capacities range from 1000 to 2,000,000 cu. ft. per hour, for maximum peak line pressures up to 25 lbs. High-pressure types range up to 75 lbs. Special arrangements can be provided for pressures up to 300 lbs. and higher. Instruments for recording or integrating available to suit any requirement.

Our long experience in supplying equipment for the production, distribution, or metering of gas is freely at your disposal. Address the factory or nearest sales office. Estimates without obligation.

Write for Bulletin 40-B10

ROOTS-CONNERSVILLE-WILBRAHAM

12th and Columbia

CONNERSVILLE, INDIANA

NEW YORK CHICAGO ST. LOUIS
BOSTON DETROIT
PITTSBURGH LOS ANGELES
POTTSTOWN, PA. SAN FRANCISCO

ROTARY POSITIVE RCW CENTRIFUGAL

Robert W. Wiederwax was recently appointed president of the Atlantic City Gas Company, Atlantic City, N. J., succeeding Chester Grey, who has resigned because of ill health. The appointment was effective on December 31.

Mr. Wiederwax was born in Albion, Mich., and started work, on part time, at the age of sixteen as a lamp trimmer with the Albion Gas Light Company. After finishing school, two years later, he went to the manufacturing department of the gas plant, where he worked as stoker, gas maker and boiler fireman. After three years, he was transferred to the distribution department, serving as pipe fitter and meter repairman.

From 1907 to 1909 Mr. Wiederwax was employed by the Lansing (Michigan) Gas and Fuel Company. In December of 1909 he was transferred to the Atlantic City Gas Company, which had been purchased by Clarence H. Geist. Mr. Wiederwax served first as distribution foreman and in June, 1910, was promoted to distribution superintendent, which position he held for twenty-three years. During that period he supervised manufacturing and for a time was in charge of the commercial office.

On June 26, 1933, Mr. Wiederwax was appointed vice-president of the Atlantic City Gas Company, which was acquired in 1930 by Public Service Corporation of New Jersey.

Obituary

FRANK LIBBY DAME

Frank Libby Dame, 66, chairman of the board and president of the North American Co., died December 30th at his home in Garden City, L. I., N. Y., from the effects of a stroke of apoplexy.

Mr. Dame is survived by his widow and three sons.

Mr. Dame was born in Boston and was graduated from the Massachusetts Institute of Technology in 1889. He entered the employ of the Westinghouse Electric Company in Pittsburgh, and from then on was connected with the electrical industry. At the time of his death he headed the oldest utility holding company in the United States.

Mr. Dame worked for the Westinghouse Company in several Western cities, turning to street railway construction and operation. In 1893, he was general manager of the Seattle Consolidated Street Railway and later general superintendent of the Tacoma Railway and Motor Co. In 1901 he became general manager of the Union Electric Co., Dubuque, Iowa.

His success in the management of railway properties led to his being named by the General Electric Co., in 1903 as engineer of its committee on local companies, supervising the operations of utility companies.

In 1909 he became president of the Electric Bond and Share Co., but resigned in 1912 to become president of the Central States Electric Corp.

During the World War Mr. Dame served in the facilities' division of the War Industries Board.

In 1920 he became vice-president of the North American Co., and six months later, in 1921, was elected president.

He was elected chairman of the board on April 25, 1932, but retained active participation in the affairs of the company in cooperation with Edwin Gruhl, who succeeded him as president. When Mr. Grohl died last January, Mr. Dame again was elected president, retaining the post as chairman.

HORACE T. SHARP

Horace T. Sharp, industrial manager of the Southern Indiana Gas and Electric Company, Evansville, Ind., and prominent civic worker, died recently at his home an hour after suffering a heart attack. He was 55 years old. He went to Evansville in 1911 from Anderson, Ind., with the Public Service Company, which the Southern Indiana Gas and Electric succeeded. The widow and one daughter survive.

TRADE NEWS

Few 1934 Calendars Still Left

The Cooper-Bessemer Corporation, Mt. Vernon, Ohio, announce that they still have a few of their 1934 calendars on hand. Individuals who have not received theirs and yet desire one, may obtain same by writing direct to The Cooper-Bessemer Corporation.

Republic Steel Makes Changes in Metallurgical Staff

Harry W. McQuaid has joined the metallurgical staff of Republic Steel Corporation, according to announcement made by Earl C. Smith, Chief Metallurgist. Mr. McQuaid, who is nationally known as an authority on carburizing steels and case-hardening methods, is the leading pioneer in grain size control and collaborated in the development of the McQuaid-Ehn test which bears his name. He will devote his time with Republic to research and development work.

Other changes incident to the broad metallurgical program under way at Republic include the transfer of Howard W. Burkett from Youngstown to the post of metallurgical engineer of the Buffalo district; the appointment of Elmer Larned in a similar capacity in the Chicago district and the acquisition of Harold T. Blair, metallurgical engineer, who will specialize in tin plate products. Karl Kautz, ceramic engineer, also has joined the Republic organization, and will specialize in research and field service on enameling sheets. M. J. R. Morris and E. R. Johnson will continue in their respective metallurgical capacities in the Central Alloy district, where all of Republic's stainless steel and much of the alloy steel are produced.

New Brochure Reproduces "A Century of Progress" in Full Authentic Colors

The American Asphalt Paint Co., makers of VALDURA Products, announce that their new brochure "COLOR AND PROTECTION" is now ready for distribution. This is a book of authentic water-color illustrations of "A Century of Progress."

Having been awarded the contract to furnish and apply the paint for all major World's Fair buildings (inside and outside), this company is especially interested in making their book an authentic record of the progress of color in industry.

The Fair Management has credited this book as being the only reproduction of the genuine flat color effects as designed by the late Joseph Urban. It is printed in 13 water-colors, silver and gold and contains 35 of the finest reproductions of the actual buildings and actual colors yet created.

You can obtain a copy of this beautiful 16 page souvenir book free by writing, on your company letterhead, to the American Asphalt Paint Co., 43 E. Ohio Street, Chicago, Illinois.

Bristol Company of Canada, Ltd., Formed

The Bristol Company, Waterbury, Conn., announces that in order to serve the Canadian market still better and to expand and consolidate its present Canadian service laboratory of 12 years' standing so as to include sales, service and manufacturing, a separate company, The Bristol Company of Canada,

LAVINO OXIDE

High Total Sulphur Absorption at Minimum Cost. Intensely Active.

"THE EFFICIENT PURIFIER"

The Sponge with the large Tough Shavings Always Uniform

LAVINO SPONGE

E. J. LAVINO and COMPANY - BULLITT BLDG. - PHILADELPHIA, PA.

NEW YORK CHICAGO PITTSBURGH

ISBELL-PORTER COMPANY

Engineers and Contractors for Complete Gas Works

I-P Co.

Manufacturers of All Kinds of Gas Apparatus

NEWARK - NEW JERSEY

GRAVER

Gas Holders and Accessory Equipment

The engineering department of GRAVER offers you expert service in modern economies of design and erection. We are equipped to handle low and high pressure gas holders of all types and all accessory equipment of steel plate construction with necessary fittings, either to your specifications or designed to your needs. GRAVER manufacturing and fabricating facilities are unexcelled, yet production costs are low. GRAVER field erection is recognized for its good workmanship. Consult GRAVER on your requirements.

General Sales Office: 332 S. Michigan Avenue, Chicago

GRAVER TANK & MFG. CORP.

General Offices and Factory East Chicago, Indiana

PURIFYING MATERIAL — BAGGED, OR IN BULK

Manufacturers of GOVERNORS, APPARATUS *and* EQUIPMENT

IRON SPONGE

Connelly Iron Sponge and Governor Co.

Elizabeth, N.J.

Chicago

1876 [USE THE BENEFIT of 57 YEARS EXPERIENCE] 1933

Send me the American Gas Journal each month for one year. I enclose $2.00 in payment of this subscription.

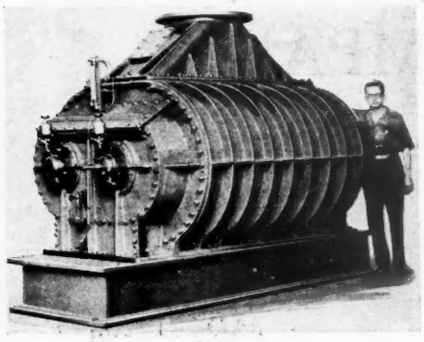
Name .....

Address .....

Ltd., has been incorporated. Factory and general headquarters will be located at 64 Princess St., Toronto, Ont., where Bristol recording, indicating and control instruments will be made. Mr. J. S. Mayberry, graduate engineer of Toronto University, and for 10 years with the parent company, has been appointed manager.

Large Meter Installation

What is claimed to be the largest single positive displacement meter ever supplied for industrial service was recently delivered to a Chicago gas company, for installation at one of the largest, if not the largest, packing plants there, by Roots-Connersville-Wilbraham, Connersville, Ind.



This 26 x 72 Connersville Meter is capable of passing more than 1,500,000 cu. ft. of 30/60 gas per hour, at a pressure of 20 lbs., and is of cast iron and steel construction throughout. According to the manufacturers, permanent accuracy is machined into this type of meter because its measuring chambers are bounded by accurately machined surfaces of heavy cast iron. Accuracy, it is stated, is not affected by overloads, so that this type may be used over a wide range of from 10% to 150% of their normal ratings. Adequate testing apparatus, including a dry-type prover with a displacement of 2800 cu. ft., insures satisfactory operation in active service.

Bulletin 40-B10 gives complete details regarding the construction and operation of this type of meter.

Bowser Service Corporation Adds Well-Known Stylist to Staff

The Bowser Service Corporation has added to its staff a well-known stylist, Linda Bonbright Lyman, who for several years has been associated with The Ladies Home Journal. Mrs. Lyman is not only well versed in merchandise in the domestic markets but in the foreign markets as well. Because of her experience in decorating and designing, Mrs. Lyman is particularly well equipped to add to the value of the Bowser Service Corporation which specializes in developing and promoting merchandise for the home.

Nason "The Solution of Your Condensation Problem" Catalogue Now Available

A new twenty page catalogue titled, "The Solution of Your Condensation Problem" is now being distributed to any executive or engineer interested, upon request, by the Nason Manufacturing Company, 71 Fulton Street, New York City, manufacturers of a complete line of Steam Traps, and other Specialties. It is unique in that it explains, and also gives the solution as experienced by companies in various industries, and likewise because it is the only catalogue of its kind which describes and illustrates a complete line of steam traps; bucket, ball float return, etc., for all purposes.

Of particular interest is its explanation of the large savings that can be effected in most every kind of plant.

Some of the many products featured are the different types of "Detroit" Return, Vacuum, Combination, and Separating Traps; also "Detroit" Receivers which are now manufactured exclusively by the Nason Manufacturing Company.

Republic Steel Issues Two New Catalogs

Republic Steel Corporation, Youngstown, O., recently announced a new booklet, Form ADV. 222-B, entitled "The Technical Story of Toncan Iron Pipe." This booklet contains facts, figures and technical data on the manufacture, applications and performance of Toncan Iron Pipe which will be of interest to the technical men. It contains 24 pages entirely stripped of installation illustrations and advertising copy and will appeal to the engineer or practical operating man who wants straight facts on corrosion-resisting Toncan Iron Pipe.

Republic Steel also announces a new edition of "Toncan Iron Pipe for Permanence" . . . just off the press. It contains 64 pages of authentic information on corrosion-resisting Toncan Iron Pipe. Part 1 is given over to technical data and tests under various conditions. Part 2 includes an imposing collection of installations and service records in a wide variety of applications. This catalog is Form ADV, 220-B.

Both these catalogs may be had by writing direct to the Republic Steel Corporation.

Orifice Meters Utilized in Fueling Graf Zeppelin

Below is shown the refueling at Akron of the Graf Zeppelin before its recent homeward trip. The giant ship which burns gas instead of gasoline, has a fuel gas capacity of 900,000 cubic feet, giving her motors a cruising radius of 6,000 miles at 65 M.P.H.

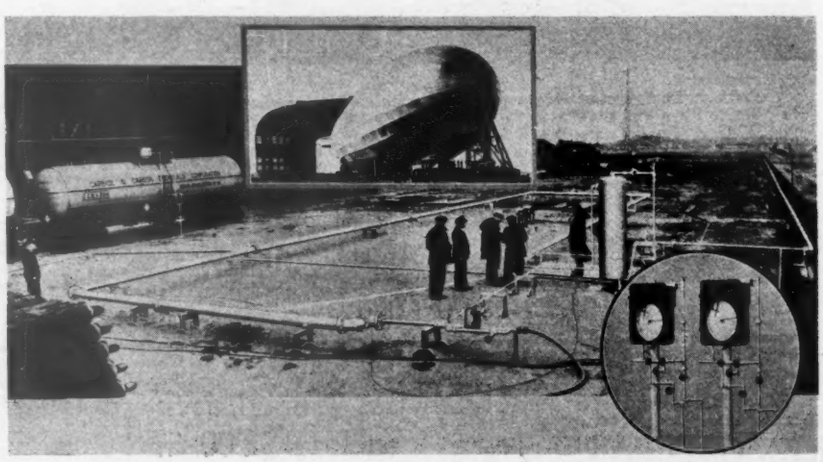
At this refueling about 750,000 cubic feet of fuel gas were taken on board, sixteen hours being required for the operation. The fuel gas is composed of approximately 65% Pyrofax and 35% Hydrogen and has a specific gravity of 1.05.

Two American Meter Company Orifice Meters are utilized in the measurement and mixing of these two gases, which require a high degree of accuracy.

Pyrofax gas is introduced into one end of the piping layout and the Hydrogen into the other end. These gases are mixed at a common outlet, and then flow through a tunnel into the air dock. Liquified Pyrofax from the tank car is passed through a steam vaporizer, the steam being provided from the railroad locomotive shown on the siding. The Hydrogen is brought in through a manifold connection and thence through a main control valve.

To maintain the temperature of the two gases constant and thereby eliminate the necessity for making corrections for flowing temperature, the hot Pyrofax gas from the vaporizer is cooled by refrigeration and the Hydrogen is heated.

This setup for measuring and controlling the fuel gas is the same as that employed in past refuelings of the Graf in Tokio, Los Angeles and Lakehurst. A similar installation is used at the permanent Zeppelin refueling base in Pernambuco, Brazil.



Courtesy Goodyear Zeppelin Corp.